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**IMPROVED SOLID WASTE MANAGEMENT
AND LITTER CONTROL IN THE
MODEL NEIGHBORHOOD**

DEMONSTRATION PROGRAM

PREPARED FOR

**COUNTY ENGINEER
COUNTY OF LOS ANGELES**

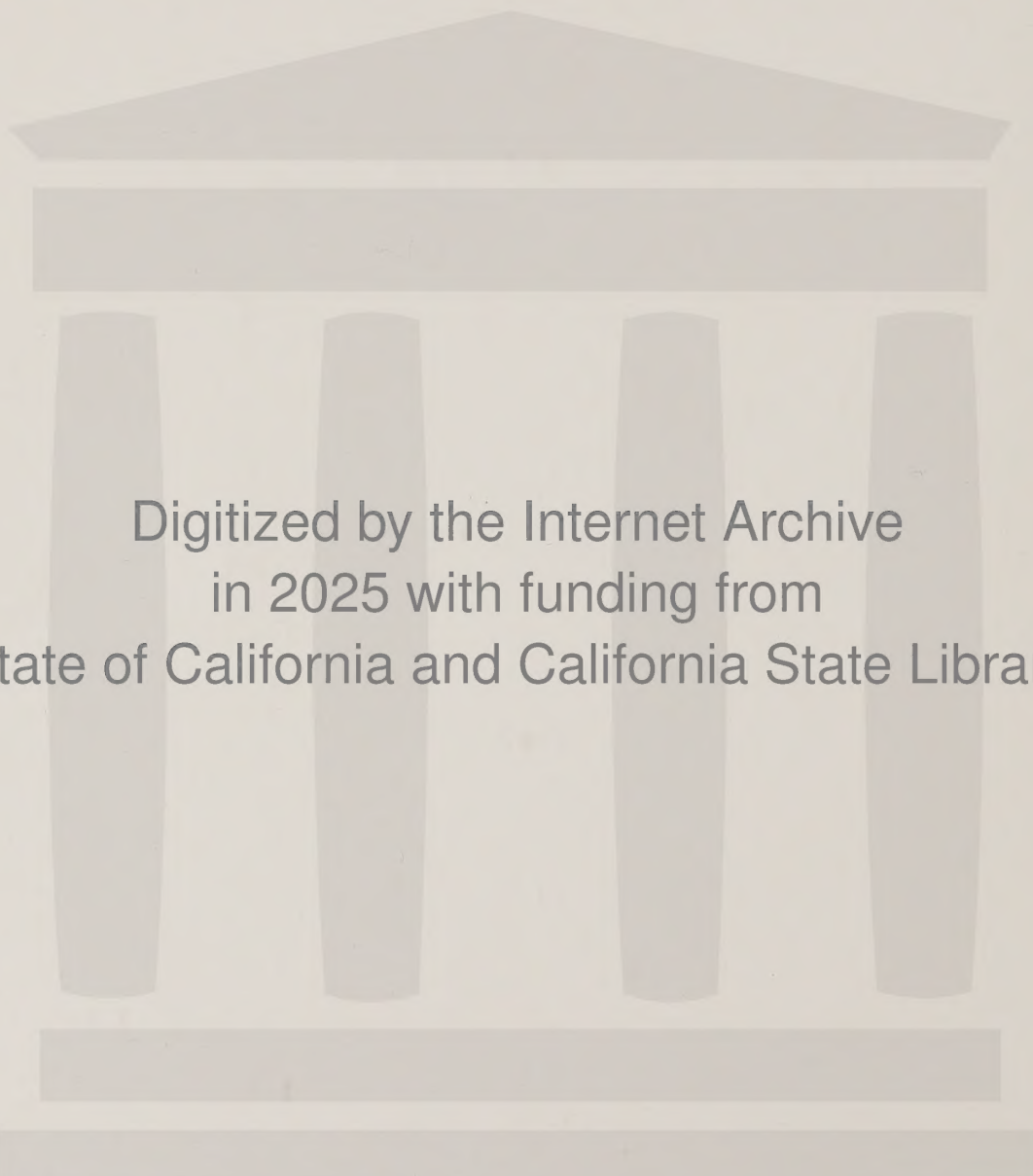
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FINAL REPORT

DEMONSTRATION PROGRAM FOR IMPROVED
SOLID WASTE MANAGEMENT AND LITTER CONTROL
IN THE
MODEL NEIGHBORHOOD

FOR

COUNTY ENGINEER
DEPARTMENT OF COUNTY ENGINEER
COUNTY OF LOS ANGELES

1971

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September 30, 1971

Mr. Harvey T. Brandt
County Engineer
County of Los Angeles
Department of County Engineer
108 West Second Street
Los Angeles, California 90012

Subject: Final Report - Demonstration Program for Improved
Solid Waste Management and Litter Control in the
Model Neighborhood

Dear Mr. Brandt:

We have completed our investigation of solid waste management and litter control in the Florence-Firestone and Willowbrook communities comprising the Los Angeles County Model Neighborhood area. The attached report contains a description of the work completed and recommends a demonstration program designed to evaluate alternative methods for alleviating solid waste and litter problems of the area.

Nearly 37,000 tons of residential solid waste and litter are removed annually from the Neighborhood area through the efforts of a private contractor, the County Road Department, and the Forester and Fire Warden. At least 85 percent of this amount originates from within private residences. An estimated \$675,000 is now expended annually for solid waste removal and litter cleanup in the Neighborhood area.

Field investigations indicated that a major problem with solid waste management is the lack of adequate containerization for wastes. An attractive neighborhood cannot be achieved while alleys, vacant lots, streets and parkways are strewn with litter and trash. Such conditions encourage more litter and resigned acceptance of litter standards below other communities comprising Los Angeles County.

Extensive interviews with residents indicated 75 percent were cognizant of litter problems, and 90 percent of this group were disturbed by the unsightly litter conditions occurring in the neighborhood. Sixty percent of the respondents to the interview series indicated willingness to participate in an organized litter control demonstration program.

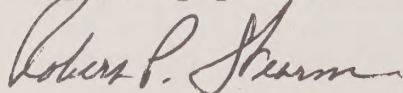
Mr. Harvey T. Brandt
County Engineer
September 30, 1971
Page 2

The recommended demonstration program encompasses the following primary elements:

- A. Use of large, uniform residential waste storage containers to minimize refuse spillage and resulting unsightly litter on streets, alleys, and vacant lots.
- B. Use of properly placed sidewalk litter containers for receipt of pedestrian refuse.
- C. Provision of supplemental street cleaning for inaccessible areas.
- D. Coordination of present street cleaning activities with residential refuse collection operations.
- E. Improvement of the awareness of area residents to the benefits of sanitation through participation in the demonstration program.
- F. Investigation of resident participation in a voluntary refuse recycling program to provide increased employment and income, while conserving limited national resources.

We look forward to assisting the County of Los Angeles in the implementation and evaluation of this demonstration program.

Very truly yours,



Robert P. Stearns
Vice President
SCS ENGINEERS

RPS:it
Enclosure

TABLE OF CONTENTS

LETTER OF TRANSMITTAL	i
TABLE OF CONTENTS	iii
ACKNOWLEDGEMENTS	viii
SUMMARY	ix
I. INTRODUCTION	
A. Purpose	I-1
B. Scope	I-1
C. Solid Waste Advisory Committee	I-2
D. Subcontractor	I-3
II. MODEL NEIGHBORHOOD DESCRIPTION	
A. Location	II-1
B. Population Description	II-1
C. Land Use and Zoning	II-8
III. EXISTING CONDITIONS OF SOLID WASTE MANAGEMENT	
A. Firestone Garbage Disposal District	III-1
B. Present Contract for Collection and and Disposal of Refuse	III-1
C. Contractor Collections	III-3
D. Street Cleaning	III-10
E. Sidewalk Litter Containers	III-13
F. Vacant Lot Cleaning	III-17
G. Alley and Parkway Cleaning	III-18
IV. SOLID WASTE MANAGEMENT OPERATIONS ANALYSIS	
A. Collection Contractor	IV-1
B. Cleanup Campaign	IV-14
C. Los Angeles County Road Department	IV-19

D.	Forester and Fire Warden	IV-22
E.	Animal Control	IV-24
V.	MODEL NEIGHBORHOOD RESIDENT QUESTIONNAIRE	
A.	Purpose	V-1
B.	Formulation and Review	V-1
C.	Distribution Areas and Method	V-1
D.	Questionnaire Analysis	V-2
E.	Results	V-2
VI.	CRITERIA FOR SELECTION OF SOLID WASTE MANAGEMENT SYSTEMS	
A.	Criteria Listing	VI-1
B.	Ranking	VI-1
VII.	ALTERNATIVE SOLID WASTE MANAGEMENT SYSTEMS	
A.	Identification of Alternatives	VII-1
B.	Advantages and Disadvantages	VII-3
VIII.	SYSTEMS ANALYSIS	
A.	Methodology	VIII-1
B.	Ranking	VIII-5
C.	Review	VIII-6
IX.	DEMONSTRATION PROGRAM PLAN	
A.	System Description	IX-1
B.	Demonstration Area Selection	IX-4
C.	Project Evaluation	IX-11
D.	Information Dissemination to Residents	IX-13
E.	Voluntary Salvage Program	IX-14
F.	Opportunities for Area Resident Employment	IX-14
G.	Project Funds	IX-16

X. IMPLEMENTATION

TABLES

II-1	Ethnic Composition	II-3
II-2	Number of Persons per Housing Unit	II-4
II-3	Number of Rooms in Housing Units	II-4
II-4	Year Structure Built	II-5
II-5	Value of Property	II-5
II-6	Listing of Building Permits Issued For the Model Neighborhood Area For the Year 1970	II-7
II-7	Family Income	II-6
II-8	Florence-Firestone Community Land Use Summary	II-9
II-9	Florence-Firestone Community Zoning Summary	II-10
II-10	Florence-Firestone Community Dwelling Unit Types/Residential Structures	II-11
II-11	Willowbrook Community Land Use Summary	II-12
II-12	Willowbrook Community Zoning Summary	II-13
II-1	Willowbrook Community Dwelling Unit Condition	II-14
III-1	Refuse Quantities Collected in Model Neighborhood Area	III-7
III-2	Composition of Model Neighborhood Area Solid Wastes	III-11
III-3	Composition of Refuse From Corresponding Areas in the City of Los Angeles	III-12
IV-1	Sample Blocks Willowbrook Community	IV-9
IV-2	Sample Blocks Florence-Firestone Community	IV-10
IV-3	Willowbrook Community Container Survey	IV-11
IV-4	Florence-Firestone Community Container Survey	IV-12

IV-5	1971 Clean-Up Campaign	IV-18
V-1	Neighborhood Problems for Senior Citizens	V-6
V-2	Senior Citizens Rating of Sanitation Services	V-7
VI-1	Ranking of System Criteria	VI-2
VIII-1	Ranking Matrix	VIII-2
VIII-2	Illustration of Evaluation Process	VIII-3
VIII-3	Illustration of Evaluation Process	VIII-4
VIII-4	Evaluation Results	VIII-5
IX-1	Land Use Summary Willowbrook Community	IX-5
IX-2	Land Use Summary Florence-Firestone Community	IX-6
IX-3	Demonstration Areas	IX-7
IX-4	Demonstration Project Cost Estimate	IX-17
FIGURES		
II-1	Location of Study Area	II-2
III-1	Refuse Quantities Collected From Firestone Garbage Disposal District	III-5
III-2	Schedule for Refuse Collection	III-8
III-3	Schedule for Street Sweeping	III-14
III-4	Locations of Existing Litter Containers	III-16
IV-1	Average Collection Time Per Stop	IV-2
IV-2	Location Map of Disposal Facilities	IV-4
IV-3	Transfer Station vs. Direct Haul Cost Relationships	IV-5
IV-4	Location of Sample Blocks	IV-8
IX-1	Community Subareas	IX-8
IX-2	Willowbrook Community Solid Waste Management Demonstration Area	IX-9

IX-3	Florence-Firestone Community Solid Waste Management Demonstration Area	IX-10
APPENDIX A		A-1
APPENDIX B		B-1
APPENDIX C		C-1
GLOSSARY		G-1

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Jack Edwards - Regional Planning Commission
Norman Hauret - Health Department
Warren Hogan - Road Department
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Warren Telting - Model Neighborhood Program
Mark Thomas - Refuse Collection Contractor

Mr. Jack K. Bryant, formerly Division Engineer of the Project Planning and Pollution Control Division, Los Angeles County Engineer, was Director of the project for the County Engineer, but resigned during the project. He was replaced by Mr. Charles G. Brisley, Jr.

SUMMARY

The County of Los Angeles, to implement the first year comprehensive plan of its Model Neighborhood program, required engineering studies to direct the development and demonstration of an improved system for solid waste management in the Florence-Firestone and Willowbrook communities. The objective of the system is to provide a cost-effective means of improving the community environment through design and implementation of improved waste containerization, better collection procedures, and a program for gaining the support and cooperation of community residents. The demonstration project is to be of six months duration and performed in an area containing approximately 1000 dwelling units.

The major elements of the project were divided into three separate but dependent groupings. First, the determination and evaluation of social, economic, and physical factors in the study area which would influence the design and operation of an improved solid waste management system; second, the design of a cost-effective, public-acceptable solid waste management system for demonstration in the Model Neighborhood area; and third, the formulation of an effective information retrieval and dissemination program to ensure the cooperation and support of neighborhood residents.

This report summarizes the preliminary studies influencing influence the design of the solid waste management system, a recommendation for an improved system, and an implementation plan for demonstration of the improved system.

Through the combined efforts of a private collection contractor, the County Road Department, and the Forester and Fire Warden, over 37,000 tons of solid wastes are removed annually from the 8.8 square mile Model Neighborhood area. At least 85 percent of the total originates from private residences, and solid waste generation is increasing at a 3 percent annual rate. An estimated \$675,000 is expended annually for waste removal and litter cleanup in the study area.

Field investigations indicated that improved containerization of residential solid waste is a key element in reducing problems of litter in the study area. Nearly half of all residential refuse storage containers were found to be in fair to poor condition. On atypical collection day, a spill of refuse (overturned storage can, etc.) occurred at every tenth home on the average. The resulting litter contributes significantly to unsightly conditions and blight in the neighborhood. Furthermore, over half the containers placed for collection did not meet standards for continued use.

Resulting unsanitary conditions from litter and improper refuse storage may be a health hazard and is a blight on property values. The lack of adequate containerization results in part from the high proportion of renters in the neighborhood and the depressed economic status of many residents.

Accumulations of trash which are not properly containerized constitute a substantial fire hazard. Approximately 700 refuse and refuse related fires outside of structures occur each year in the neighborhood.

An attractive, sanitary model neighborhood cannot be achieved while alleys, vacant lots, streets, parkways, and lawns are strewn with litter and trash. Such conditions encourage more litter and resigned acceptance of litter amounts well above the standards of the community as a whole.

Over 1000 interviews with area residents indicated that 75 percent were cognizant of litter problems and 90 percent were disturbed by litter and the resulting unsightly conditions. Fully 60 percent of those interviewed indicated willingness to participate in an organized litter control program.

Additional sidewalk litter containers are needed at locations where substantial quantities of litter are generated; i.e., certain commercial areas, schools, bus stops, and other locations where people congregate. As a part of the system demonstration, citizens will be encouraged to properly store waste and use litter barrels.

During the preliminary analysis to derive the demonstration project, 10 alternative solid waste management systems were given technical and socio-economic consideration. These included:

- Household Compactors
- Sink Garbage Grinders and Conventional Waste Storage Containers
- Disposable Trash Bags
- Use of Conventional Containers
- Separate Collection for Salvage Using Disposable Trash Bags
- Twice Weekly Collection of Combined Refuse
- On-Property Collection of Combined Refuse Using Disposable Bags

- Twice Weekly Collection with Conventional Containers
- Semi-Automated Container Lift System
- Semi-Automated Container Lift and Separate Collection for Salvage

Each alternative contained common elements of supplemental street sweeping, additional litter containers, coordination of street sweeping with refuse collection activity, and a vacant lot cleaning program.

A list of criteria desired in the solid waste management system were developed which recognize area needs and socio-economic characteristics. These were:

- Reduce street litter
- Minimize costs
- Provide employment
- Improve aesthetics
- Convenient for use
- Enable combined collection
- Acceptable to contractor
- Demonstrable
- Resist animal attack
- Owner and renter acceptance
- Reduce related problems
- Flexible
- Reliable and proven
- Implementable
- Self-sustaining
- Improve community pride
- Reduce health hazards
- Known to residents

Each of the criteria was ranked as to its relative importance by a panel of experts in solid waste management who were cognizant of the socio-economic and litter problems of the study area. These same experts then carefully judged the effect of each of the ten alternative management systems upon each of the above listed criterion.

Several of the waste management systems were found feasible; however, additional analysis indicated the best system to be the following. A large capacity refuse storage container designed for semi-automated collection and improved household waste storage is proposed. This container is expected to reduce problems of spilled trash in the alleys and streets on collection day while achieving economies in refuse collection service costs. Additional parts of the improved solid waste management system include: sidewalk litter containers to reduce pedestrian litter, supplementary street sweeping activities to clean inaccessible areas of the neighborhood and in keeping the neighborhood clean between normally scheduled days of street sweeping, coordination of normal sweeping with refuse collection operations and continuation of vacant lot cleanup, alley improvement and cleaning programs initiated under the Model Neighborhood Program.

A three month demonstration of the special storage container system is recommended followed by a three month demonstration in the same area of conventional galvanized metal and plastic containers for comparison purposes. During the demonstration further studies will be performed of the feasibility of involving area residents in a voluntary program of refuse segregation for salvage. A trial of the salvage program will be conducted in a small area.

Based on available information and resident questionnaire results, two demonstration areas were selected as being representative of the entire Model Neighborhood area. Each includes approximately 450 living units.

A proposed budget of \$111,400 for conducting the demonstration is presented.

Opportunities for employment of area residents in the conduct and evaluation of the demonstration system are detailed. A film using area residents is planned to assist in describing the demonstration project.

Future implementation of the demonstration system throughout the Model Neighborhood is complicated by an existing contract between a private refuse collection contractor and the Firestone Garbage Disposal District which ends in 1975. Based on preliminary cost estimates, implementation of the demonstration system could be accomplished throughout the Neighborhood by increasing present annual expenditures for

waste management in the area by approximately 25 percent. Increased efficiency in refuse and litter collection could reduce this percentage.

CHAPTER I

INTRODUCTION

A. Purpose

Los Angeles County, under the first year comprehensive demonstration plan of the Model Neighborhood Program, authorized Project 33.6 entitled, "Research and Prototype for Disposal of Solid Waste." The objective of Project 33.6 was "to improve the quality of the environment in the Model Neighborhood by developing and demonstrating improved methods for the reclamation, storage, and collection and disposal of solid waste material." In December of 1970, SCS Engineers was retained by the Los Angeles County Engineer to investigate problems of solid waste and litter in the Los Angeles County Model Neighborhood area.

This report presents a description of the study area, identifies solid waste management problems in the area, and presents recommendations for an improved solid waste management system for demonstration.

B. Scope

Contract requirements included a review and analysis of the extent and nature of the solid waste management problem in the study area, encompassing those related to:

- Residential rubbish and garbage
- Street, alley, and sidewalk litter
- Vacant lot litter

In addition, the contract required the following project elements:

- Compile descriptive information for the area from available census data, county records, and field sampling.
- Compile descriptive representative information using field sampling and time and motion techniques on present methods and efficiency of waste storage, collection, and disposal, and lot and street cleaning operations.
- Formulate and implement an information gathering program to provide for area residents input and support for the development of the demonstration program.

- Determine the composition of study area solid wastes.
- Select a representative area of approximately 1000 residential units to serve as the demonstration area.
- Recommend and prepare plans and specifications for a six-month field demonstration test of an improved solid waste management system in the demonstration area, including the role of the refuse collection contractor and area residents.
- Employ area residents through a subcontractor to assist in the performance of designated work tasks.

C. Solid Waste Advisory Committee

Early in the project an advisory committee was formed to facilitate interchange of information and ideas between the various county agencies concerned with the Neighborhood environment, the consultant's staff, and the private contractor collecting solid waste in the study area. The purpose of the committee was threefold: (1) to provide a liaison man in each agency through whom needed information could be obtained; (2) to ensure coordination between this project and ongoing work and responsibilities of all agencies operating in the area; and (3) to achieve proper interfacing of the proposed demonstration system with future planning of the affected agencies in the area.

Members of the Solid Waste Advisory Committee represented the following agencies of the County of Los Angeles:

- Department of Animal Control
- Health Department
- Forester and Fire Warden
- County Road Department
- Model Neighborhood Program
- Department of County Engineer
- Regional Planning Commission

The other members included a representative from SCS Engineers and from the private collection contractor operating in the Neighborhood area.

The committee met at periodic intervals during the project. These meetings were productive in that they provided valuable

sources of information describing related areas of work affecting environmental conditions in the study area, and for interchange of information among the various county agencies.

D. Subcontractor

A subcontractor to assist SCS Engineers in the hiring and supervision of area residents for employment during certain elements of the study was selected. The types of work involved and the requirements of the subcontractor were delineated by the consultant and reviewed with representatives of the County Engineer and the Model Neighborhood Program. Three firms were subsequently contacted and interviewed, leading to the selection of Frank Holoman and Associates of Los Angeles as the subcontractor for the project.

The primary responsibility of the subcontractor was in the area of hiring, training, and supervision of qualified residents of the Model Neighborhood area for field data gathering tasks conducted during the study. Accordingly, area residents were hired and trained by the subcontractor to assemble information on existing conditions and operations of waste management in the study area, and to administer a comprehensive questionnaire to residents of the area.

Additionally, two area residents were hired by SCS Engineers to assist in clerical and technical duties associated with the project. A total of 18 man-months of employment for area residents was provided.

CHAPTER II

MODEL NEIGHBORHOOD DESCRIPTION

A. Location

The study area is located in Figure II-1. Included are the communities of Florence-Firestone and Willowbrook, two unincorporated areas in south-central Los Angeles County. The area lies east of the Harbor Freeway and is bounded on the north by Slauson Avenue, on the south by Rosecrans Avenue, and on the east by Alameda Street. The community of Watts (part of the city of Los Angeles) lies between the two communities. Many of the inner-city physical, economic, and social pressures existing in Watts are also present in the study area. Dramatic social, economic, and ethnic changes have occurred. Once suburban in character, the growth of metropolitan Los Angeles has incorporated the area into the urban core with problems of racial imbalance, housing conditions, poverty, and waste management. The study area is approximately 8.8 square miles with level topography.

Pertinent information was obtained from the County Department of Urban Affairs, Model Neighborhood Program (MNPD), the County Regional Planning Commission (RPC), the U.S. Department of Commerce - Census Bureau, and other sources.

B. Population Description

Census data was obtained for 1960 and 1965.^{1,2} 1970 census data was not available at the date of this report. The 1965 special census was completed following the Watts riots. Several special studies of the Florence-Firestone and Willowbrook communities have been completed since 1965 by the RPC.

The RPC estimates the population of the 5.4 sq mi Willowbrook community to be 38,335 as of October, 1969. Dwelling units totaled 9,415 in number. Major populated areas of the community lie east of Central Avenue. The western portion includes several large vacant and industrial areas. The average household in Willowbrook (1965) consisted of 4.08 persons compared to an average of 2.78 per household in Los Angeles County as a whole. Negro population in the community increased from 74 percent in 1960 to 84 percent in 1965. The median age of Willowbrook residents in 1960 was 18.7 years, 12 years below that for Los Angeles County.

Florence-Firestone is 3.4 sq mi in area and RPC staff estimated its 1969 population at 41,160 persons. The community is bounded on the north by the central manufacturing area



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FIGURE II-1

LOCATION OF STUDY AREA

of Los Angeles, the region's largest concentration of industrial and wholesale enterprise.

A RPC land use survey in 1969 indicated a total of 13,455 dwelling units in the community. The average number of persons per occupied dwelling unit was 3.30. Between 1950 and 1965 the proportion of Negro residents increased from 18 percent to 57 percent. In 1965, persons with a Spanish surname comprised 28.4 percent of the population. In 1960, the Florence-Firestone community had a relatively youthful population. There were one-third more persons under 10 years of age in the community than in Los Angeles County. Whereas 52 percent of the Los Angeles County population was over 30 years of age, only 33.2 percent of the Florence-Firestone population was in this category. In 1965, 22 percent of the study area families were subsisting on poverty incomes.

Table II-1 illustrates the ethnic composition of the study area communities for 1960 and 1965. The decreasing trend in population occurring between 1960 and 1965 has reversed during the 1965-69 period; increasing from 73,440 in 1965 to 79,495 in 1969. The primary exodus of persons between 1960 and 1965 were whites. During the period the Negro population remained fairly constant: 48,899 in 1960 and 50,360 in 1965.

TABLE II-1

ETHNIC COMPOSITION

	1965		1960	
	Florence	Willowbrook	Florence	Willowbrook
Total population	41,690	31,750	46,944	33,264
White	17,500	4,810	22,326	8,314
Negro	23,620	26,740	24,284	24,615
Other races	570	200	334	335

Table II-2 tabulates the number of persons residing in housing units in 1960 and 1965. During the 1960-65 period, the number of occupied housing units decreased; however, since 1965, an increase in both population and total available dwelling units has occurred.

TABLE II-2

NUMBER OF PERSONS
PER HOUSING UNIT

	1965		1960	
	Florence	Willowbrook	Florence	Willowbrook
All occupied housing units (No.)	12,610	7,770	13,806	8,004
1 person	2,910	810	2,606	834
2 people	3,190	1,770	3,306	1,573
3 people	1,660	1,200	2,406	1,305
4 people	1,500	1,250	1,849	1,147
5 people	1,180	860	1,405	1,079
6 or more persons	2,170	1,880	2,234	2,066

Table II-3 tabulates the number of rooms in study area housing units. The median number of rooms per housing unit in the Florence-Firestone community was 4.1 in 1965 and the corresponding figure for Willowbrook was 4.7. Reflecting the construction of several housing tracts, there was an increase in the number of housing units with six or more rooms during the period in the Willowbrook community.

TABLE II-3

NUMBER OF ROOMS
IN HOUSING UNITS

	1965		1960	
	Florence	Willowbrook	Florence	Willowbrook
All housing units (No.)	14,530	8,710	14,975	8,443
1 room	100	10	213	74
2 rooms	1,050	390	1,296	355
3 rooms	3,500	820	3,917	936
4 rooms	4,440	2,710	4,412	3,191
5 rooms	3,700	2,460	3,368	2,520
6 rooms	1,310	1,590	1,304	1,054
7 rooms	340	500	352	212
8 or more rooms	90	230	113	101
Median no. of rooms	4.1	4.7	4.0	4.4

Table II-4 indicates that the structures in Florence-Firestone are generally older than those in Willowbrook. Nearly 80 percent of Florence-Firestone structures were over 21 years old in 1965. In contrast, the Willowbrook community had only 42 percent of the structures in this category. It is noteworthy that the proportion of owner occupied structures in Willowbrook remained over 50 percent, while those in Florence-Firestone decreased from 37 percent in 1960 to 31 percent in 1965.

TABLE II-4

YEAR STRUCTURE BUILT

	<u>1965</u>		<u>1960</u>	
	Florence	Willowbrook	Florence	Willowbrook
Within last 10 yrs	1,610	1,230	1,311	1,563
Within last 20 yrs	1,570	3,850	2,676	3,732
21 yrs ago or more	11,350	3,630	10,988	3,148
Owner occupied ...	4,570	4,620	5,517	4,787
Percent	31	53	37	56

The difference in the age of structures in the two communities is reflected in Table II-5. In 1965, the median dollar value of property in the older Florence-Firestone community was approximately 20 percent less than for Willowbrook.

TABLE II-5

VALUE OF PROPERTY

	<u>1965</u>		<u>1960</u>	
	Florence	Willowbrook	Florence	Willowbrook
Owner-occupied housing units	4,360	4,510	4,613	4,410
Less than \$5,000	130	90	232	115
\$5,000 to \$9,900	1,270	700	2,413	1,553
\$10,000 to \$14,900	1,740	1,300	1,671	2,202
\$15,000 to \$19,900	870	1,790	248	485
\$20,000 to \$24,900	200	330	37	36
\$25,000 or more	150	300	12	19
Median . . dollars	12,000	15,400	9,400	11,000

Building permits issued in the study area during 1970 were obtained from the County Engineer and are presented in Table II-6. Activity increased during the summer months. The principal type of building permit was for either an alteration or demolition. Of 890 permits issued during 1970, nearly 50 percent were for alteration to a residential structure. About 20 percent were for residential demolition. There were only 15 permits for new construction of non-residential buildings and 54 permits for new residential structures in the area.

Table II-7 presents family income distribution for the two communities. Residents of the Willowbrook community have significantly higher family incomes than those of Florence-Firestone. The increase in median income between 1960 and 1965 was 12 percent in Willowbrook and only 1 percent in Florence-Firestone.

TABLE II-7

FAMILY INCOME

	<u>1965</u>		<u>1960</u>	
	Florence	Willowbrook	Florence	Willowbrook
All families (No.)	9,490	6,860	10,928	7,127
Under \$1,000	420	210	828	494
\$1,000 to \$1,999	870	360	994	510
\$2,000 to \$2,999	1,080	700	1,050	570
\$3,000 to \$3,999	1,250	770	1,272	933
\$4,000 to \$4,999	1,330	880	1,659	1,067
\$5,000 to \$5,999	1,300	840	1,537	1,083
\$6,000 to \$6,999	1,060	720	1,239	687
\$7,000 to \$7,999	540	600	712	517
\$8,000 to \$8,999	480	520	586	425
\$9,000 to \$9,999	400	300	412	275
\$10,000 to \$14,999	690	730	532	440
\$15,000 to \$24,999	70	230	85	111
\$25,000 and over	--	--	22	15
Median income (dollars)				
Families	4,846	5,607	4,796	4,990
Families and unrelated individ- uals	4,164	5,105	4,105	4,574

In 1965, 38 percent of the Florence-Firestone families received an annual income of less than \$4000.

TABLE II-6

LISTING OF BUILDING PERMITS
ISSUED FOR THE MODEL NEIGHBORHOOD AREA
FOR THE YEAR 1970

Type of permit	Use of building or structure	Month (1970)												Total
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Alteration	Residential	13	22	26	41	38	38	49	41	35	44	35	31	413
Demolition	Residential	3	1	32	15	14	8	35	22	18	16	13	8	185
New	Res. Garage	3	3	6	4	5	1	4	3	0	3	3	5	40
New	Dwelling	1	3	5	0	19	1	4	7	2	3	2	7	54
Relocated	Dwelling	3	2	1	5	1	1	12	2	1	2	4	8	42
New	Non-Resid.	1	0	1	1	1	1	3	2	3	0	2	0	15
Alteration	Non-Resid.	2	8	2	6	0	7	6	5	1	2	5	4	48
Demolition	Non-Resid.	2	6	4	5	5	1	4	7	10	2	8	5	59
New	Struct. other than bldgs.	0	2	2	4	1	4	7	8	2	1	2	1	34
Total		28	47	79	81	84	65	124	96	72	73	69	72	890

Source: Los Angeles County Department of Building and Safety. Firestone and Lennox Districts.

C. Land Use and Zoning

The Los Angeles County Regional Planning Commission supplied 1969 land use and zoning information for Florence-Firestone and zoning information for Willowbrook.^{3,4} Land use in Willowbrook was last compiled by the RPC in 1966.

The current land use pattern in Florence-Firestone has evolved over many years. Commercial strip areas along highways were popular prior to development of the current shopping center concept.

Florence-Firestone contains 13 categories of land use which are summarized in Table II-8. Residential use represents 46 percent of the community area and 11.5 percent of the community has industrial use. Less than 3 percent is classified vacant land.

The basic zoning pattern has existed in the community for over 25 years. A summary of zoning is presented in Table II-9. Many properties have prior uses which would not now be permitted under present zoning requirements. For example, over 25 percent of the light manufacturing zone was residentially used in 1969. Although only 15 acres are zoned for single family dwelling uses, 384 acres are so used. Noncommercial uses occupy over 25 percent of the commercially zoned area, and residential, commercial, and other nonconforming uses occupy about one-third of the industrially zoned land in Florence-Firestone.

Over 16 percent of the study area housing was considered deteriorated by the RPC as compared with the Los Angeles County average of less than 7 percent. An estimated 4,100 dwelling units are to be rehabilitated in the study area during the next three years under the Model Neighborhood Program.

The housing supply in Florence-Firestone consists primarily of single family dwellings with 71 percent of the dwelling units in this category. Table II-10 presents information on dwelling unit types.

A summary of 1966 land use in the Willowbrook community is presented in Table II-11. Again, the predominant use is single family dwellings. Zoning information is summarized in Table II-12. Of over 1,530 acres zoned for residential use, nearly 1,200 acres are so used. No information was available on nonconforming uses.

A recent survey conducted by the Los Angeles County Health Department indicated that the percentage of housing in delapidated condition or in need of major repairs ranged from 4 percent in the west-central area of Willowbrook to 65 percent in an area adjacent to the community's eastern boundary. Approximately 36 percent of the existing residential structures

TABLE II-8
FLORENCE-FIRESTONE COMMUNITY
LAND USE SUMMARY

Land Use	Area (Acres)	Percent of Total
Single Family	384.3	17.5
Two Family	416.7	19.0
Multi-Family	196.1	9.0
Commercial	71.1	3.3
Industrial	250.9	11.5
Vacant	59.3	2.8
Schools	58.8	2.7
Parks	53.4	2.4
Public & Institutional	37.3	1.7
Railroad R/W	71.9	3.3
Power Transmission R/W	28.9	1.3
Utility Stations	10.8	0.5
Streets & Alleys	546.4	25.0
Total	2185.9	100.0

Source: Los Angeles County Regional Planning Commission

TABLE II-9

FLORENCE-FIRESTONE COMMUNITY
ZONING SUMMARY

Zone	Area* (Acres)	Percent of Total
Residential		
A-1	33.3	2.0
R-1	14.7	0.9
R-2	392.9	24.0
R-3	617.8	37.7
R-4	70.4	4.3
Subtotal	1129.1	68.9
Commercial		
C-2	32.4	2.0
C-3 & 4	87.6	5.3
Subtotal	120.0	7.3
Peripheral		
P	1.7	0.1
Subtotal	1.7	0.1
Industrial		
M-1	151.6	9.3
M-2	210.1	12.8
M-3	27.0	1.6
Subtotal	388.7	23.7
Total	1639.5	100.0

*Excludes streets and alleys.

Source: Los Angeles County Regional Planning Commission

TABLE II-10
FLORENCE-FIRESTONE COMMUNITY
DWELLING UNIT TYPES/RESIDENTIAL STRUCTURES¹

Structural Type	Dwelling Units		Structures	
	Number	Percent	Number	Percent
Single-Family	9,551	71.0	9,551	86.3
Two-Family	2,034	15.1	1,017	9.2
Multi-Family	1,870	13.9	390	3.5
Vacated	NA	NA	100	1.0
TOTAL	13,455 ²	100.0	11,068	100.0

NA - Not available

¹July 1969

²Excludes dwelling units in 110 vacated structures

Source: Los Angeles County Regional Planning Commission

TABLE II-11
WILLOWBROOK COMMUNITY
LAND USE SUMMARY

Land Use	Area (Acres)	Percent of Total
Single Family	1024.7	39.4
Two Family	140.8	5.4
Multi-Family	31.5	1.2
Commercial	49.0	1.9
Industrial	131.2	5.0
Vacant & Agriculture	469.1	18.0
Schools	88.3	3.4
Parks	43.1	1.7
Public & Institutional	24.8	1.0
Railroad R/W	35.5	1.4
Flood Control R/W	10.2	0.4
Power Transmission R/W	13.1	0.5
Utility Station	0.8	<0.05
Streets & Alleys	537.8	20.8
Total	2599.9	100.1

Source: Los Angeles County Regional Planning Commission

TABLE II-12
WILLOWBROOK COMMUNITY
ZONING SUMMARY

Zone	Area* (Acres)	Percent of Total
Residential		
A-1	67.4	3.3
R-1	1027.5	49.8
R-2	264.1	12.8
R-3	172.6	8.4
Subtotal	1531.6	74.3
Commercial		
C-H	0.3	<0.05
C-1	23.2	1.1
C-2	29.7	1.4
C-3	30.3	1.5
Subtotal	83.5	4.0
Peripheral		
P	7.4	0.4
PR	2.0	0.1
B-1	7.1	0.3
B-2	1.6	0.1
Subtotal	18.1	0.9
Industrial		
M-1	165.4	8.0
M-1-1/2	117.0	5.7
M-2	55.3	2.7
M-3	91.2	4.4
Subtotal	428.9	20.8
Total	2062.1	100.0

*Excludes streets and alleys.

Source: L.A. County Regional Planning Commission

in Willowbrook were constructed prior to the adoption of the first Los Angeles County Building Code in 1933. Table II-13 presents data on the condition of residential structures in Willowbrook.

TABLE II-13

WILLOWBROOK COMMUNITY
DWELLING UNIT CONDITION

Condition	Number	Percent
Sound	2918	33.1
Minor Repair	3420	38.7
Major Repair	1819	20.6
Dilapidated	607	7.0
Not Rated	55	0.6
Total	8819	100.0

Source: Model Neighborhood Agency L.A. County Department of Urban Affairs

Three parks are located in the Florence-Firestone community occupying a total land area of 57.3 acres. There are four parks totaling 46.7 acres located within Willowbrook.

Six elementary schools, two junior high schools, and a portion of one senior high school are within Florence-Firestone. The Florence-Firestone community is located entirely within the Los Angeles Unified School District. Willowbrook is served by the Compton Unified and Los Angeles Unified School Districts. Ten elementary schools and one junior high school are located in Willowbrook.

REFERENCES

1. U. S. Bureau of the Census, 1960 Decennial Census, U. S. Government Printing Office, Washington, D. C., 1961.
2. U. S. Bureau of the Census, Current Population Reports, Series P-23, No. 18, "Characteristics of the South and East Los Angeles Areas: November 1965," U. S. Government Printing Office, Washington, D. C., 1966.
3. Los Angeles County Regional Planning Commission, "Willowbrook Community Land Use and Zoning," November 1969.
4. Los Angeles County Regional Planning Commission, "Florence-Firestone Community Study, Background Report," July 1970.

CHAPTER III

EXISTING CONDITIONS OF SOLID WASTE MANAGEMENT

A. Firestone Garbage Disposal District

Sections 4100 to 4165.7 of the California State Health and Safety Code govern the formation and administration of a Garbage Disposal District. District formation is generally initiated by the County Board of Supervisors and then voted upon by the voting citizens within the District boundaries. If a majority vote favorably, the Board of Supervisors can order District formation.

The Firestone Garbage Disposal District (FGDD) is one of eight such Districts within Los Angeles County. With minor exception, the boundaries of the study area coincide with those of the FGDD.

The Los Angeles County Board of Supervisors is the governing body of the FGDD. Its powers include those to enact and enforce rules and regulations for the collection and disposal of refuse. The Board may acquire real or personal property in the name of the County, and own, control, manage, and dispose of any interest in real or personal property necessary or convenient for the collection and disposal of refuse in the District. The Board regularly enters into contracts with private refuse collection and disposal firms to accomplish refuse disposal from the FGDD and other Districts. The Los Angeles County Health Department administers these contracts for refuse collection and disposal.

The Board levies a tax each year upon the taxable property in the FGDD which is sufficient to defray the cost of collection and disposal of refuse, and for other expenditures as are authorized by the Code.

B. Present Contract for the Collection and Disposal of Refuse

The Board of Supervisors has contracted with a private collector for the collection and disposal of refuse in the FGDD during the period January 1, 1971, through June 30, 1975. Pertinent provisions of the contract are delineated below.

- Contractor to furnish all labor, material, and equipment necessary for the collection of refuse within the FGDD.
- Contractor to dispose of collected refuse at a location outside the FGDD.
- Work to be done in a thorough and workmanlike manner under the direction of the Los Angeles County Health Department.

- Contractor has the exclusive duty, right, and privilege to collect and remove refuse within the District for the contract period.
- All refuse collected by the contractor shall become his property from and after the time of collection.
- Refuse shall mean all discarded material included within the definition of garbage, combustible rubbish, and noncombustible rubbish. (See Glossary for definitions of garbage, combustible, and noncombustible rubbish.)
- Combustible and noncombustible rubbish shall be deposited for collection in substantial leakproof containers not to exceed 45 gallons capacity or 70 lbs in weight, including container. Garbage shall be thoroughly drained and wrapped prior to placement in containers.
- Property owners and tenants may segregate their garbage and deposit it, properly wrapped, for collection in metal or plastic leakproof containers, equipped with suitable close fitting covers and not exceeding 16 gal in capacity. The garbage so stored shall be collected at least twice during each calendar week in unlimited amounts within the residential area.
- Combustible and noncombustible rubbish shall be collected in unlimited amounts at least once during each calendar week.
- Combustible and noncombustible rubbish not reasonably susceptible to containerization may be placed in securely tied bundles not over 4 ft in length nor over 70 lbs in weight each. Combustible and noncombustible rubbish resulting from repairing or demolishing buildings or resulting from new construction shall be limited to 70 lbs or less each week from each private residence or business establishment.
- Bulky items shall be collected by the contractor upon request of the householder or the Health Officer within 24 hours after notification. Householder shall place these items at the curb or alley for collection.
- The container requirements may be altered by the Health Officer as the circumstances in his opinion merit.

- Upon approval by the Health Officer, garbage, combustible and noncombustible rubbish may be combined during collection and transported in one vehicle.
- Contractor is to provide an annual cleanup campaign during which time he shall collect in unlimited amounts such items as furniture, household bedding, lawn furniture, refrigerators, stoves, water heaters, car parts, tires, lumber, plaster, dirt, rocks, bricks, tree stumps, and other similar or bulky material without restriction, limitation, or notification.
- The contractor shall collect on Monday and Friday the contents of approximately 100 sidewalk litter containers located in the commercial areas of the FGDD.
- Salvage operations are prohibited on any truck, trailer, or other conveyance used to collect refuse in the FGDD.
- The contractor and/or his employee shall pick up any refuse deposited upon the streets, roads, highways or sidewalks, public or private property, by reason of the activities of the contractor.
- Compensation to the contractor shall be based upon the January 1, 1971, District area and population, and increased or decreased in proportion to the number of inhabitants. The increase or decrease in number of electric light meters within the FGDD is deemed to accurately reflect the increase or decrease in inhabitants served. The County Auditor shall make a count of all electric meters within the District at periods of six months during the term of the contract.

Based on the contractor's bid, and the January 1, 1971, count of electric meters in the District, the monthly payment to the contractor for service was \$1.5135 per electric meter. During successive six-month periods, the contractor's total monthly compensation will be based upon the updated meter count multiplied by this basic meter rate.

The contract cannot be cancelled unless the contractor fails to perform. Modifications to the contract can be made with mutual agreement.

C. Contractor Collections

In view of the short operating experience in this area of the present contractor, the previous contractor was interviewed

and provided information on collection problems, complaints received, and refuse quantities collected.

Figure III-1 presents residential solid waste quantities collected for the period from May, 1969, to December, 1970. Special collections are not included on the figure. The chart line represents a "least squares" best fit to the data and indicates that quantities of refuse increased at the annual rate of 3 percent during the period.

During 1970, refuse quantities averaged about 2600 tons per month or 120 tons per collection day. Based on a 1970 estimated FGDD population of 80,000, the daily per capita refuse generation averaged 2.1 lbs. The comparable figure for collections in the city of Los Angeles during the 1969-70 period was 2.25 lbs.

A special cleanup campaign was conducted during a four week period in October of 1969. Contractor records indicated that nearly 700 tons of waste materials were collected during the campaign.

Both the previous and present contractor operating in the FGDD use a one-man crew and 37 cu yd "Shu-Pak" side-loading compactor truck. Collections of combined refuse are made once weekly from the curb or alley. The same truck is used for twice weekly garbage collections. The truck completes collections of garbage and then returns to a regular combined refuse route to complete filling the truck.

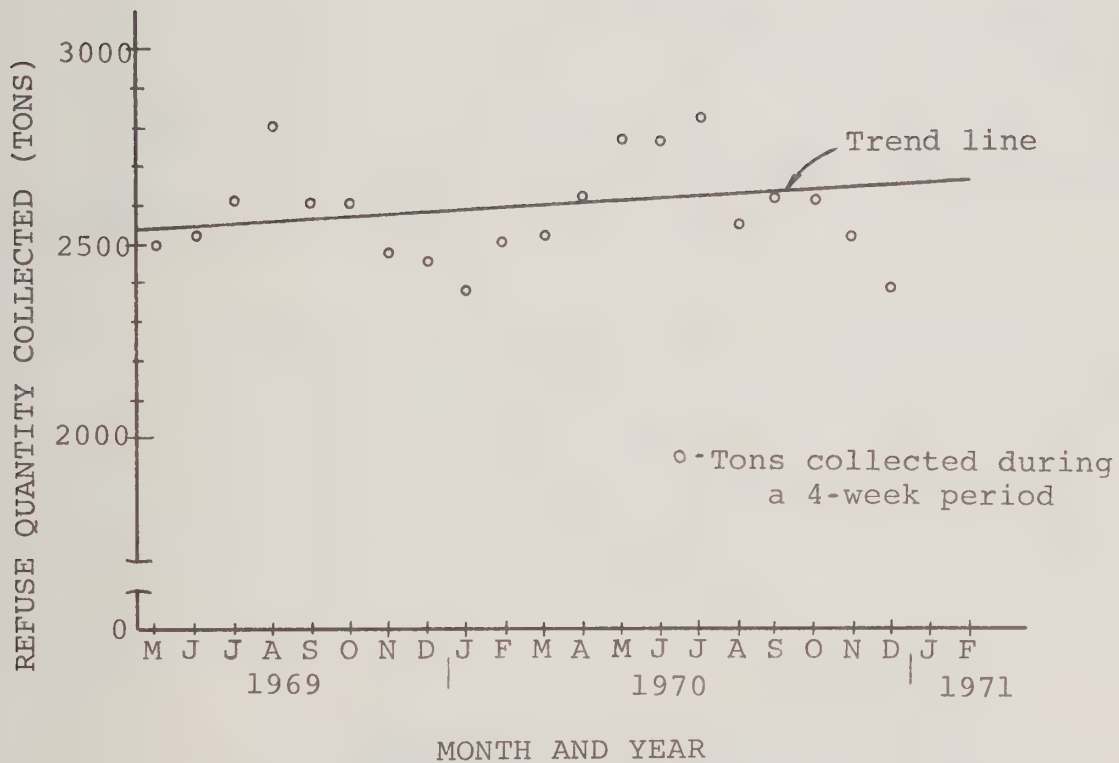
Photographs III-1 and III-2 illustrate the collection vehicle and loading operation.



Photograph III-1
Collection Vehicle



Photograph III-2
Loading the Collection
Vehicle



Source: Records of Private Refuse Collection Contractor

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FIGURE III-1

REFUSE QUANTITIES
COLLECTED FROM FIRESTONE
GARBAGE DISPOSAL DISTRICT

According to the previous contractor, the more difficult areas for collection are along the eastern boundary of the FGDD adjacent to Alameda Street. Structures in this area are older. Residents often lacked proper containers and did not properly prepare refuse for collection. The westerly and southerly areas of the FGDD are newer and better maintained by residents, therefore posing fewer collection problems.

The previous contractor reported that residents were particularly careless in placing refuse in containers where alley collections were provided. A pile of refuse often accumulated near the container and vandalism was also a problem. Many alleys are narrow and difficult to negotiate with the large collection trucks. The County Road Department estimated there are approximately 35 miles of alleys in the study area and collections are routinely made from about 13 miles.

Complaint records of the previous contractor were reviewed. Complaints are received by the Los Angeles County Health Department and the contractor. The recorded complaints generally were related to alleged missed pickups and tagged containers. Illegal or overweight containers were tagged by the contractor. Missed pickups were often caused by the homeowner neglecting to place his refuse at the curb in time for collection on the designated collection day. Photograph III-3 illustrates the lack of sufficient proper containers for refuse.



Photograph III-3
Refuse Placed for Collection

During 1965, an average of 90 tons of refuse per day was collected in the FGDD. At that time there were approximately

22,400 electric meters which formed the basis for service payments to the contractor. By 1970, the refuse quantity had increased to 120 tons per day, and the count of meters (January 1, 1971) had increased to 23,309. A 4 percent increase in meters resulted in a one-third increase in refuse quantity! Although increasing per capita refuse generation may be partially responsible, the previous contractor feels that the number of persons per household has increased because relatives or other families share living quarters or occupy converted garages.

The present contractor supplied refuse quantity data for collections completed early in 1971. These are presented in Table III-1. Saturday collections include separately stored garbage and some special collections.

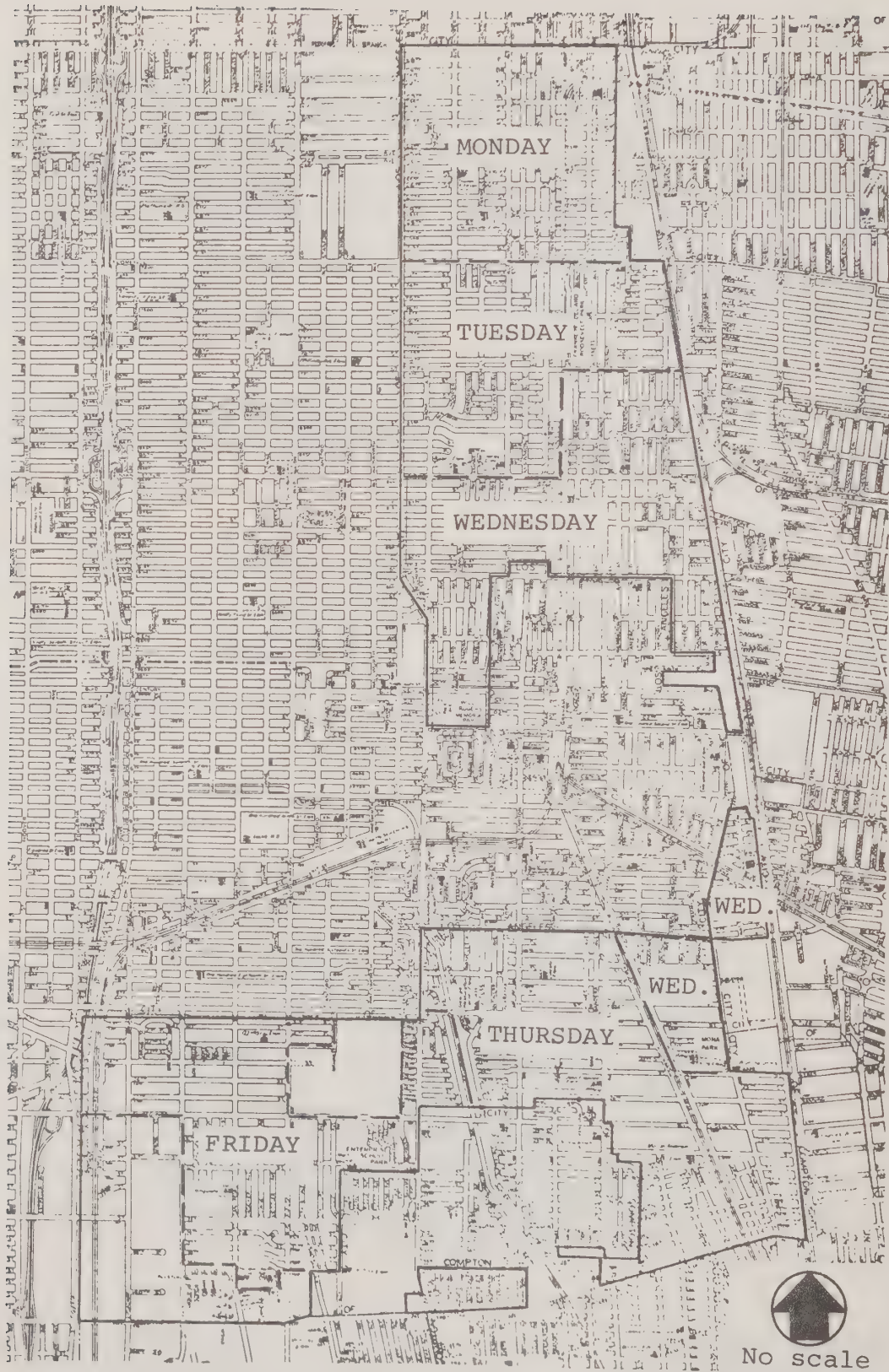
TABLE III-1
REFUSE QUANTITIES¹ COLLECTED
IN MODEL NEIGHBORHOOD AREA

<u>Week ending</u>	<u>Day of Week</u>						<u>Total</u>
	<u>M</u>	<u>T</u>	<u>W</u>	<u>Th</u>	<u>F</u>	<u>S</u>	
Jan. 23, 1971	97.80	99.74	135.18	122.08	126.80	1.49	583.09
Jan. 30, 1971	105.35	98.57	134.35	114.54	107.04	1.23	561.08
Feb. 6, 1971	106.41	101.66	130.59	127.45	111.54	1.96	579.61
Feb. 13, 1971	105.45	104.40	139.00	131.31	119.02	1.01	600.19
Feb. 20, 1971	107.33	107.90	149.91	137.93	124.43	3.52	631.02

Source: Records of Private Refuse Contractor

¹ All tabulated values are tons

The present contractor has divided the FGDD into five collection areas, one for each day of the week as shown on Figure III-2. Collection routes for individual crews are selected within each daily collection area to ensure that each crew's work load is reasonably similar.



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FIGURE III-2

SCHEDULE FOR REFUSE
COLLECTION

Approximately four tons of refuse was collected from the study area on four separate days and hand segregated in order to estimate area refuse composition. Photographs III-4 and III-5 illustrate refuse being delivered and dumped for the segregation work. Photographs III-6 and III-7 show refuse being segregated.



Photograph III-4
Refuse Delivery



Photograph III-5
Refuse for Segregation



Photograph III-6
Sorting Work



Photograph III-7
Sorting Work

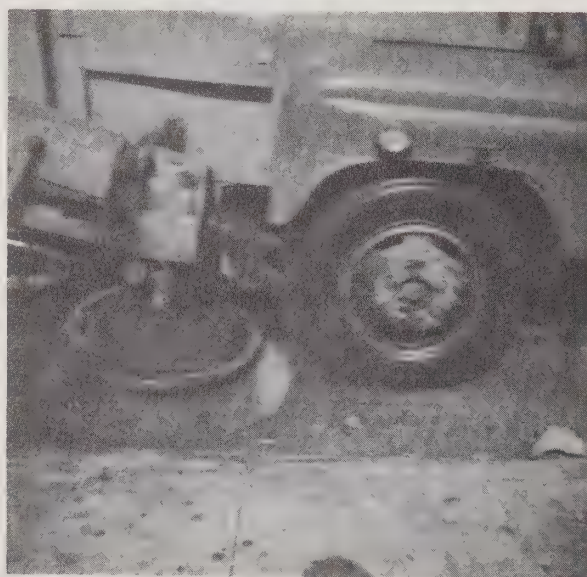
Results of the refuse composition sampling program appear to correlate well with more extensive sampling work performed by the city of Los Angeles in nearby locations. Table III-2 presents results of the study area refuse composition work. Table III-3 indicates corresponding data from the city of Los Angeles. Paper and paper products represent the largest fraction of the refuse; averaging 41 percent in the study area and slightly more than 41 percent in corresponding areas of Los Angeles. Glass and metal, both considered valuable for salvage in the Los Angeles area, averaged nearly 10 percent and 9 percent respectively in the study area. Corresponding values in the city of Los Angeles were 7.3 percent and 6 percent respectively.

D. Street Cleaning

Street cleaning in the study area is performed by the Los Angeles County Road Department. In the residential areas streets are cleaned using modern mechanical street sweepers on a once per week frequency. The sweeping is completed during a two hour time bracket, when street parking is prohibited. On a given street the curb on one side may be swept on a Tuesday; the other side would be swept on the following Thursday. Photographs III-8 and III-9 illustrate street cleaning activity in the area. Photograph III-10 shows a cleaned curb and gutter just after sweeping was completed.



Photograph III-8
Street Sweeper



Photograph III-9
Gutter Broom on Street
Sweeper

TABLE III-2
COMPOSITION OF MODEL NEIGHBORHOOD AREA
SOLID WASTES¹

Waste Type	Amount in Samples (lbs)	Percent of Total ²	Range in Samples Percent of Total ² (High) (Low)	
Food Wastes (garbage)	320	4.0	5.9	2.2
Garden Wastes (tree trimmings)	1042	13.0	19.1	0
Paper Products (cardboard, news- paper, and miscel- laneous paper)	3275	40.7	48.9	37.1
Metals (ferrous and non-ferrous)	688	8.6	10.8	7.6
Glass	777	9.7	14.7	6.6
Plastics, rubber, and leather	394	4.9	9.4	3.1
Textiles (rags, etc.)	218	2.7	4.3	1.1
Wood and lumber	300	3.7	16.2	1.2
Rocks, ceramics, dirt, and grass	1023	12.7	19.0	3.4
Total	8037	100.0		

¹Waste collected on Thursday (2/18/71), Friday (2/19/71), Monday (2/22/71), and Tuesday (2/23/71).

²Percent of wet weight.

TABLE III-3

COMPOSITION OF REFUSE FROM CORRESPONDING
AREAS IN THE CITY OF LOS ANGELES

Waste Type	Percent of Total ^{1,2}	Percent of Total ^{1,3}
Cardboard	3.17	3.6
Newspaper	8.81	10.7
Misc. Paper	28.77	27.0
Plastic Film	0.54	0.9
Molded Plastics	0.85	1.2
Leather, Rubber	0.34	0.5
Textiles (Rags, etc.)	1.80	2.0
Lumber	1.75	1.6
Tree Trimmings	19.00	21.5
Glass	6.13	7.3
Ceramics, Stones	0.58	0.8
Non-ferrous Metals	0.41	0.8
Ferrous Metals	5.15	5.2
Garbage	5.86	5.3
Grass and Dirt	16.23	11.6
Total	100.00	100.0

Source: City of Los Angeles Bureau of Sanitation

¹Percent of wet weight.

²Forty-four loads during 1970.

³Eighty-eight loads (including 44 above) during 1970-71.



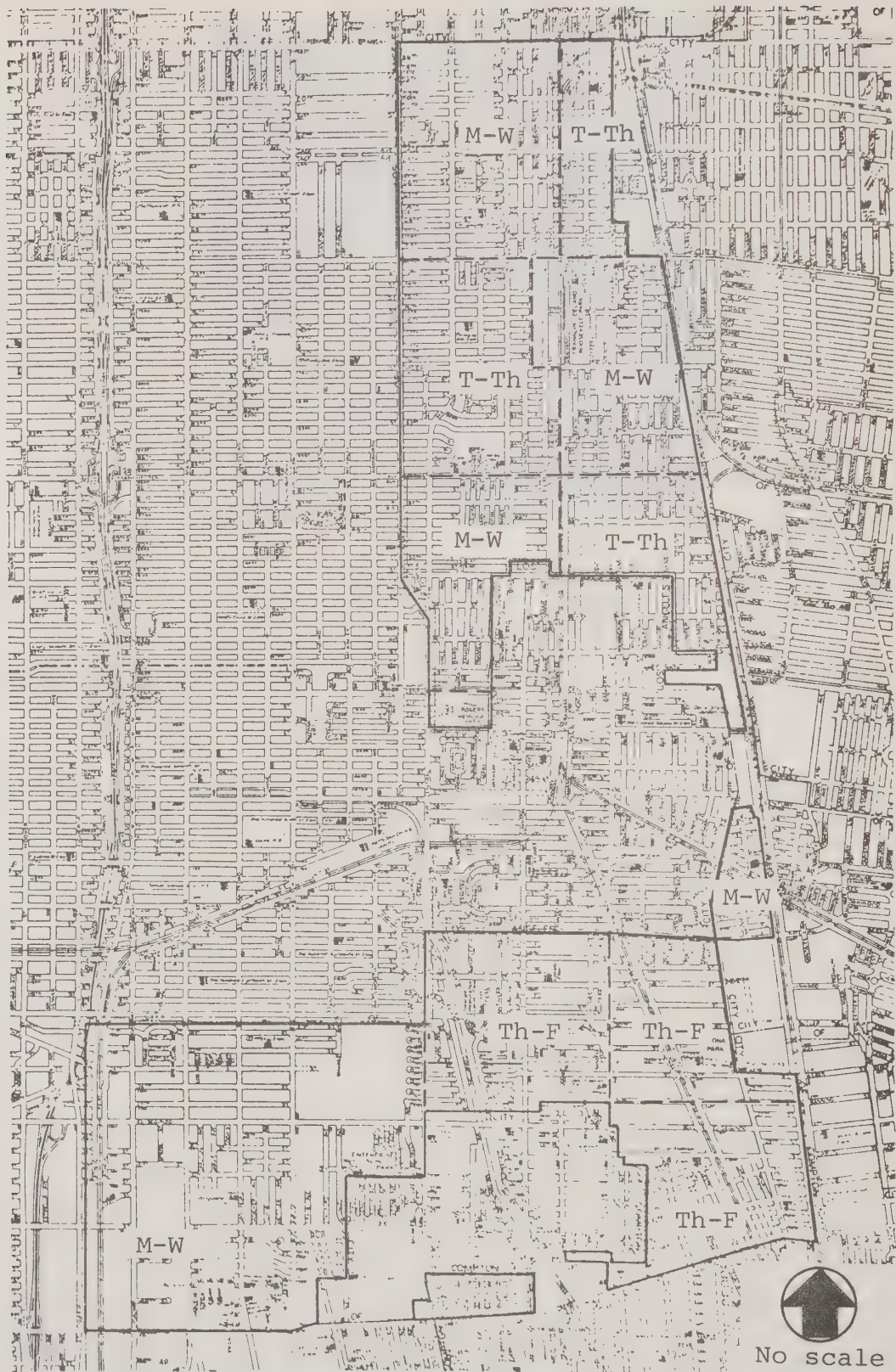
Photograph III-10
Cleaned Curb and Gutter

Mechanical street sweepers are capable of sweeping 35 to 40 miles of curb each day. Sweeping is curtailed on rainy days and on holidays.

The major highways traversing the study area are swept more frequently, generally at least twice each week. This extra sweeping is provided because the more heavily traveled streets are found to have more dirt and litter. There are approximately 270 curb miles requiring regular sweeping in the Model Neighborhood area. Alleys were not swept with the mechanical sweepers, nor were those streets in the area lacking paved curb or gutter. The latter situation is infrequent in the area. Alleys improved under a parallel Model Neighborhood program are being swept. A map of the study area showing scheduled street sweeping days is illustrated in Figure III-3.

E. Sidewalk Litter Containers

Street and sidewalk litter is a serious problem in many locations of the study area. The Road Department has located about 90 litter containers at points where large quantities of litter have historically been found. The private collection contractor empties the contents of each container on Monday and Friday. A collection truck completes this work prior to commencing its regularly scheduled residential route. Photographs III-11 and III-12 illustrate litter container types currently in use.

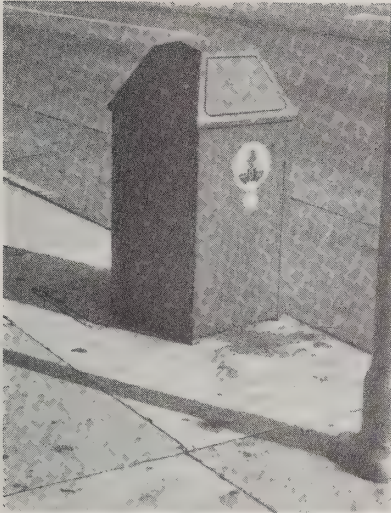


Source: Los Angeles County Road Department

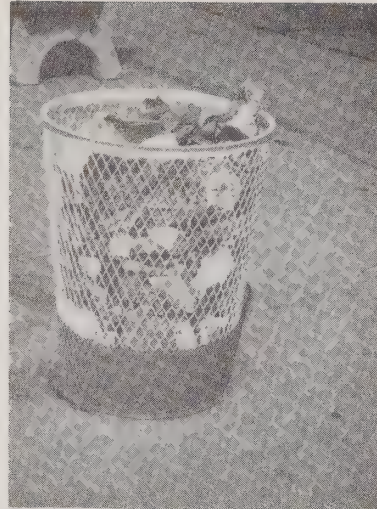
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FIGURE III-3

SCHEDULE FOR STREET
SWEEPING



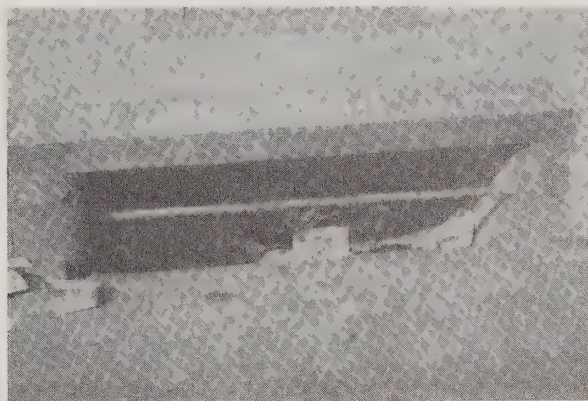
Photograph III-11
Swing Top Litter
Container



Photograph III-12
Wire Basket Litter
Container

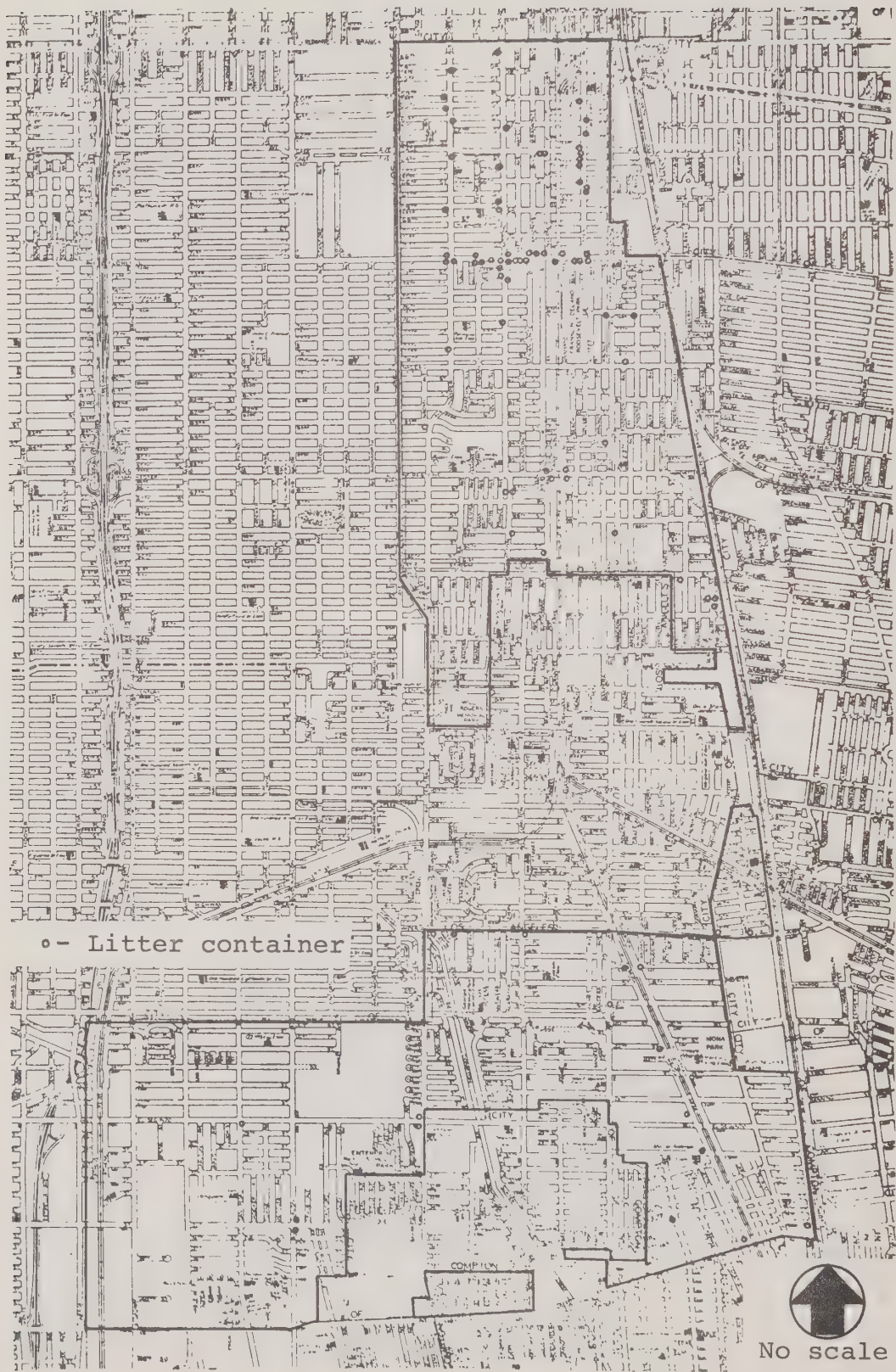
The county is gradually replacing the more expensive swing top container with the wire basket type.

Photograph III-13 illustrates a problem resulting from uncontrolled sidewalk and street litter - a storm drain catch basin filled with litter. These conditions provide harborage for rats, and can render the storm drain system ineffective during heavy rainfalls.



Photograph III-13
Littered Catch Basin

Figure III-4 illustrates the location of existing litter containers in the study area.



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FIGURE III-4

LOCATIONS OF EXISTING
LITTER CONTAINERS

F. Vacant Lot Cleaning

The Los Angeles County Forestry and Fire Warden Department conducts an active program of vacant lot cleaning in the study area as a fire prevention measure. The property owner of record is notified of the need for vacant lot cleaning. If the owner fails to comply, a crew of the Department cleans the lot and invoices the owner for the cost.

A total of 705 vacant lots in the study area were counted by the Department in early 1971.

Under a 1971 Model Neighborhood program project, the Department has greatly improved vacant lot cleanup work in the area. Neighborhood residents are employed to assist in more frequent cleanup work and more efficient cleanup methods are being applied. These methods include the use of tractor mounted discs, work crews using hand tools, and modern compactor refuse trucks. Photographs III-14 and III-15 illustrate lots prior to cleaning. Note the litter and brush on these lots.



Photograph III-14
Lot Prior to Cleaning



Photograph III-15
Lot Prior to Cleaning

Photographs III-16 and III-17 illustrate two lots which had been recently cleaned by the Department.



Photograph III-16
Vacant Lot After Cleaning



Photograph III-17
Vacant Lot After Cleaning

G. Alley and Parkway Cleaning

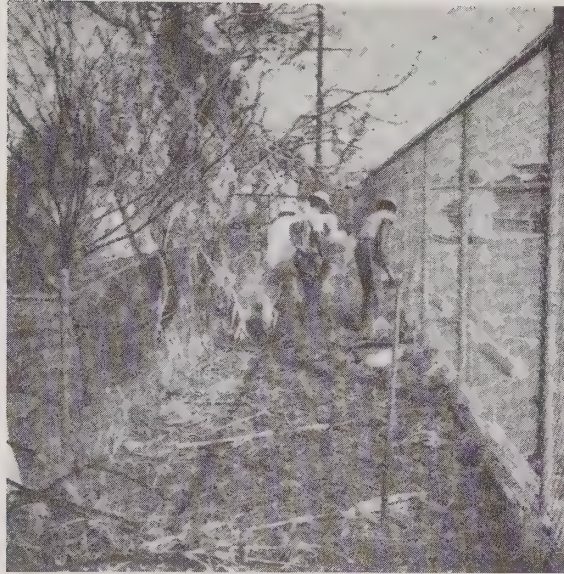
The Los Angeles County Road Department administers a program for alley and parkway cleanup work in the study area. Many alleys become weed and litter infested because of poor paving and lack of use. Parkway cleaning is particularly necessary at vacant lot locations, and is coordinated with the vacant lot cleaning program previously described. Alley and parkway cleaning crews utilize Department equipment and are supervised by Department personnel. Workers are supplied from the County General Relief rolls. Dump trucks and hand tools are used for the cleanup work. Photographs III-18 to III-20 illustrate alley paving conditions and workers cleaning alleys.



Photograph III-18
Poor Paving in Alley



Photograph III-19
Workmen Clearing Alley



Photograph III-20
Workmen Clearing Unpaved
Alley

CHAPTER IV

SOLID WASTE MANAGEMENT OPERATIONS ANALYSIS

Field and office studies were completed to analyze existing operations of the solid waste collection contractor. Street, vacant lot, and alley cleaning activities of the Los Angeles Road Department and the Forester and Fire Warden Department were also reviewed. This work sought to define the following:

- Procedures used
- Equipment and personnel utilization
- Problems
- Results achieved
- Effectiveness

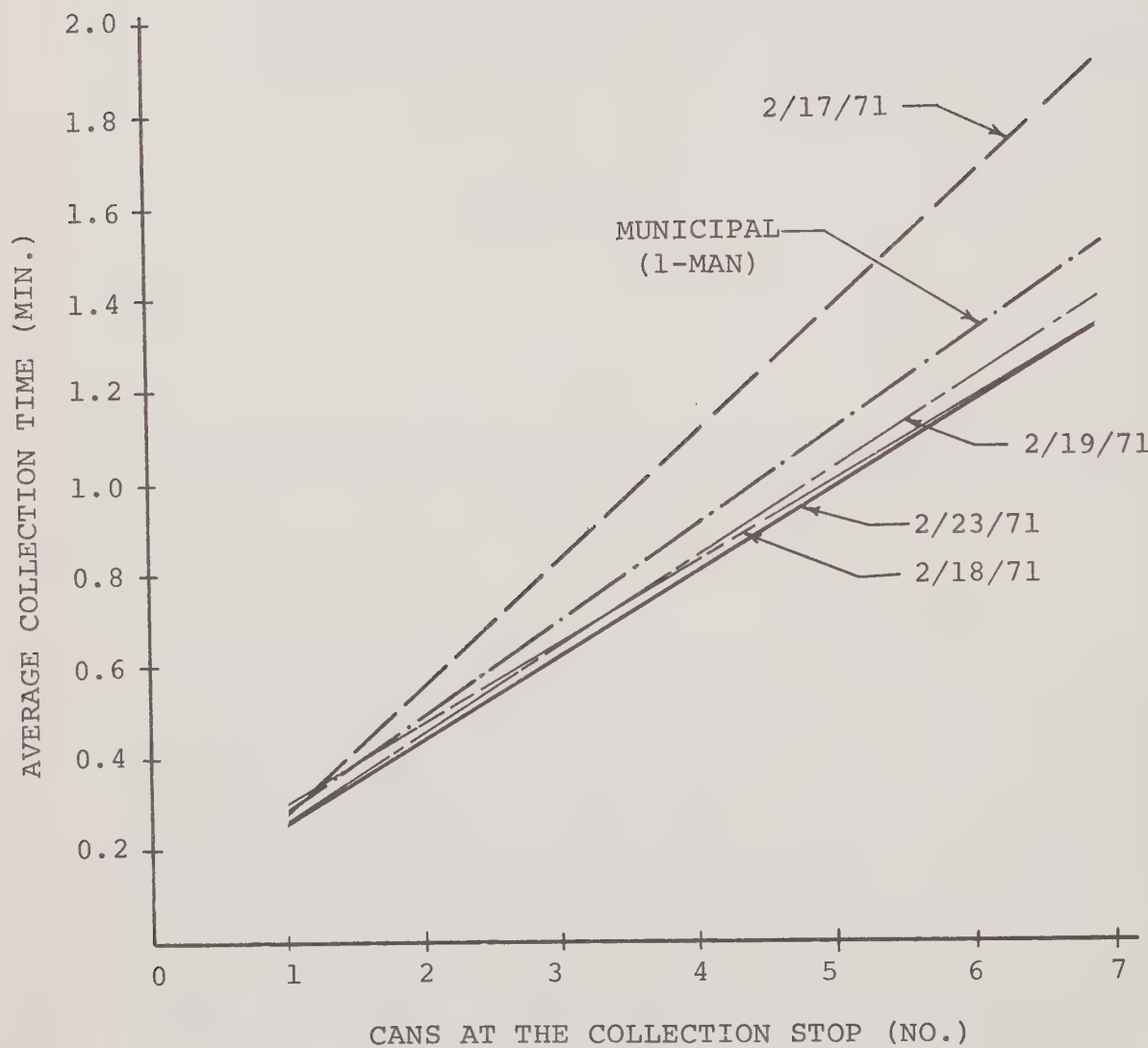
These studies were thus intended to identify waste management problems and opportunities or needs for improved procedures and techniques in the study area.

A. Collection Contractor

Surveys of the solid waste collection contractor's operations in the study area were completed. Technicians accompanied five separate crews operating collection trucks on routes over a five day period. Stopwatches were used to record incremental service times for collection stops and for travel time between collection stops. Additionally, the number and types of refuse containers placed at the curb or alley location for collection were recorded and the time and mileage required for haul from the route to the disposal site noted. Tonnage collected by each crew was recorded and the total elapsed time noted.

Although the contractor's crews had operated only a short time on the collection routes, they were experienced operators, and field time studies are believed to be representative.

Figure IV-1 was compiled from field time study data on individual crews and illustrates the average collection time for refuse storage containers located at the curbside. Also shown is information developed during previous studies for a nearby municipal collection system operating efficiently with one-man crews and similar equipment. The close comparison between contractor crew performance and that of the municipal



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FIGURE IV-1
AVERAGE COLLECTION
TIME PER STOP

operation indicates that the contractor's crews are performing at an acceptable work rate in the study area. The number of stops completed during the day by each crew varied from 223 to 295 with an average of 264. Tonnage collected per crew ranged from 10.92 tons to 12.14 tons with an average of 11.61 tons. The average quantity of refuse collected per stop was 88 lbs.

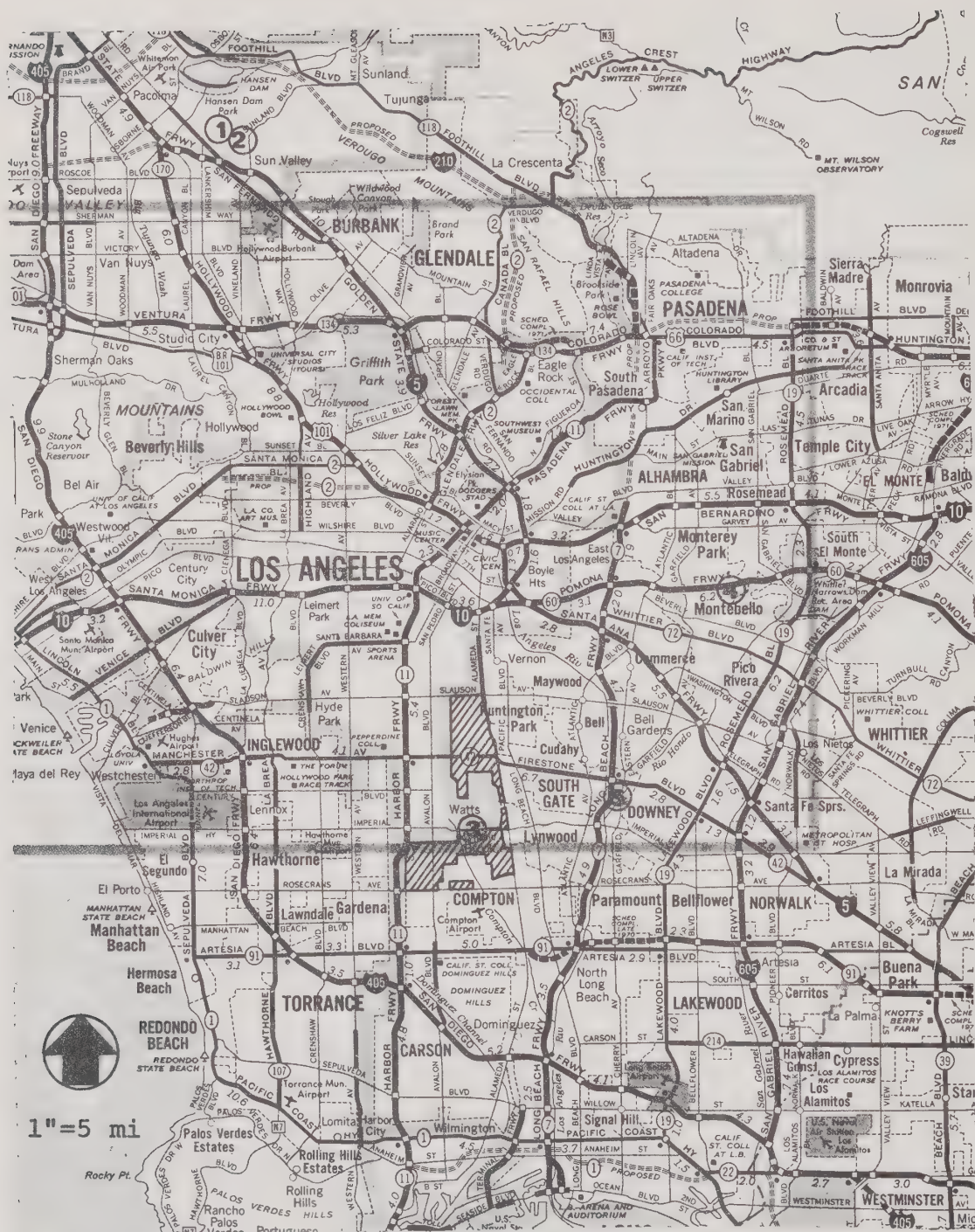
A man-hour per ton figure ranging from 0.66 to 0.73, assuming an eight hour day, compares favorably with efficient municipal and private collection operations. One field foreman coordinates collection activities of the crews. The contractor has been operating ten collection trucks and crews daily in the study area. Extra equipment is available on short notice in the event of breakdown or extraordinary quantities of refuse.

The contractor's equipment storage yard is located in Sun Valley, California. The Bradley landfill is located within one mile of the yard and is used for disposal of study area refuse. The yard and disposal site are located approximately 28 miles from the assumed geographical center of the study area (intersection of Compton Avenue and Imperial Highway). The freeway system provides a fast haul route for collection vehicles over 22 of the 28 mile haul distance. The large capacity (37 cu yd) collection trucks operated by one man can economically haul refuse over these long distances. Each man normally completes one full load each day, thus return trips to the collection area are not required. Contiguous yard and disposal site locations improve long haul economy also.

The nearest alternative disposal site is Operating Industries in Monterey Park. Figure IV-2 illustrates the location of the study area, alternative disposal sites, and the equipment storage yard. Also shown on the figure is the South Gate Refuse Transfer Station operated by the Los Angeles County Sanitation Districts. A transfer fee of \$5 per ton is charged at this site.

The contractor considered the use of the Operating Industry site or the South Gate Transfer Station. Existing yard and maintenance facilities in Sun Valley, favorable disposal rates at the Bradley disposal site, and the operation of large capacity one-man collection vehicles over fast freeway routes, however, resulted in his selection of the current procedure as the most economical. Figure IV-3 illustrates the cost factors involved and verifies the conclusion.

The total cost per ton (ordinate scale on Figure IV-3) includes haul cost from the collection point to the disposal

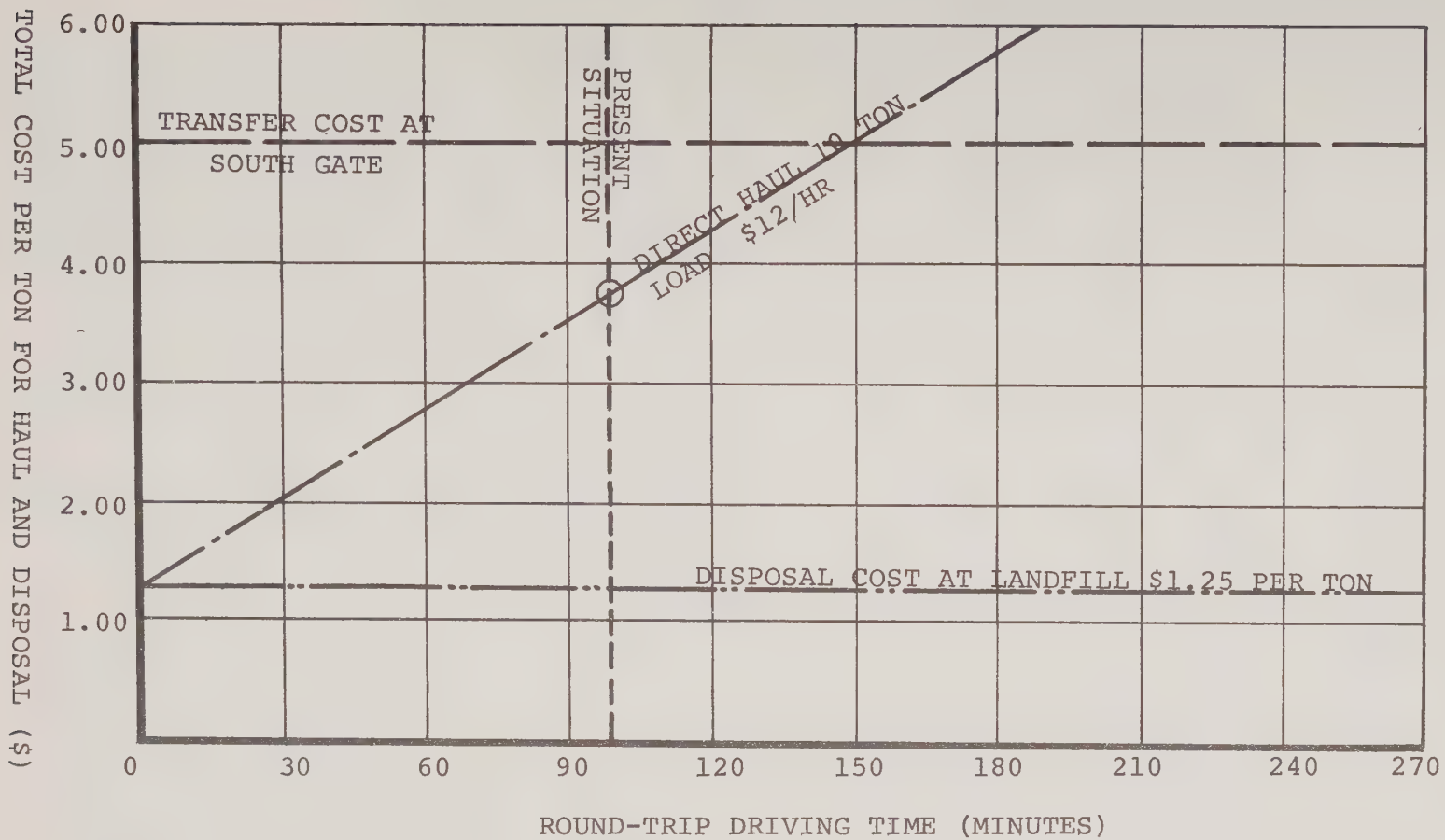


LEGEND

- ① Bradley Landfill Disposal Site
- ② Contractor Yard
- ③ Study Area
- ④ Operating Industries Landfill Disposal Site
- ⑤ South Gate Transfer Station

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FIGURE IV-2
LOCATION MAP OF
DISPOSAL FACILITIES



Source: Sanitation Districts of Los Angeles County

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FIGURE IV-3
TRANSFER STATION VS. DIRECT HAUL
COST RELATIONSHIPS

site and charges levied at the disposal site. The round trip driving time from the study area to the Bradley site would average 100 min. based on a one-way travel time of 45 minutes and 10 minutes for disposal. Thus disposal costs are \$3.75 per ton (intersection of vertical line on Figure IV-3 with line labeled "Direct Haul"). Since this amount is less than the transfer cost at the South Gate Transfer Station, use of the station is uneconomical. This simplified calculation ignores travel time to the transfer station which also favors the present method.

The second alternate involving use of the Operating Industries site would be more economical only if collection trucks could return to the study area for additional refuse after discharging their first full loads. However, between five and six hours are now required to fill the collection trucks. Assuming the use of the Operating Industries site for the disposal of this first load, only 1.5 to 2 hours would remain for the truck to return to the study area, collect refuse, and complete the 45 minute return to the storage yard location in Sun Valley. The haul time gained by such a procedure would be more than offset by inefficiency in use of collection equipment. The contractor could, however, use the Operating Industries site when unusually heavy quantities of refuse necessitate the return to study area of some trucks for second loads.

Some residents elect to place garbage into separate containers for twice weekly collection. Few residents avail themselves of this service, and the contractor estimated that only about 2 cu yds of separate garbage is collected daily. The collection truck collects in the designated garbage collection area for a portion of the day then returns to its regularly scheduled refuse route.

Twice weekly collection of garbage in separate containers is not common in the Los Angeles area. The predominant practice is to drain and wrap garbage and combine it with other refuse in a container for once weekly collection. This practice is satisfactory from a health and sanitation standpoint if suitable containers are used and residents properly wrap garbage. The greater frequency of garbage grinders in homes has contributed to the acceptance of once per week collection of combined household refuse. Separate twice weekly collection of garbage in the study area is costly and could be eliminated if residents cooperated by wrapping garbage and using proper containers.

As a basis for field sampling within the study area, a random sample of blocks was chosen in each geographical unit which total about 10 percent of the properties within the study area. All land uses were represented in the 69 blocks

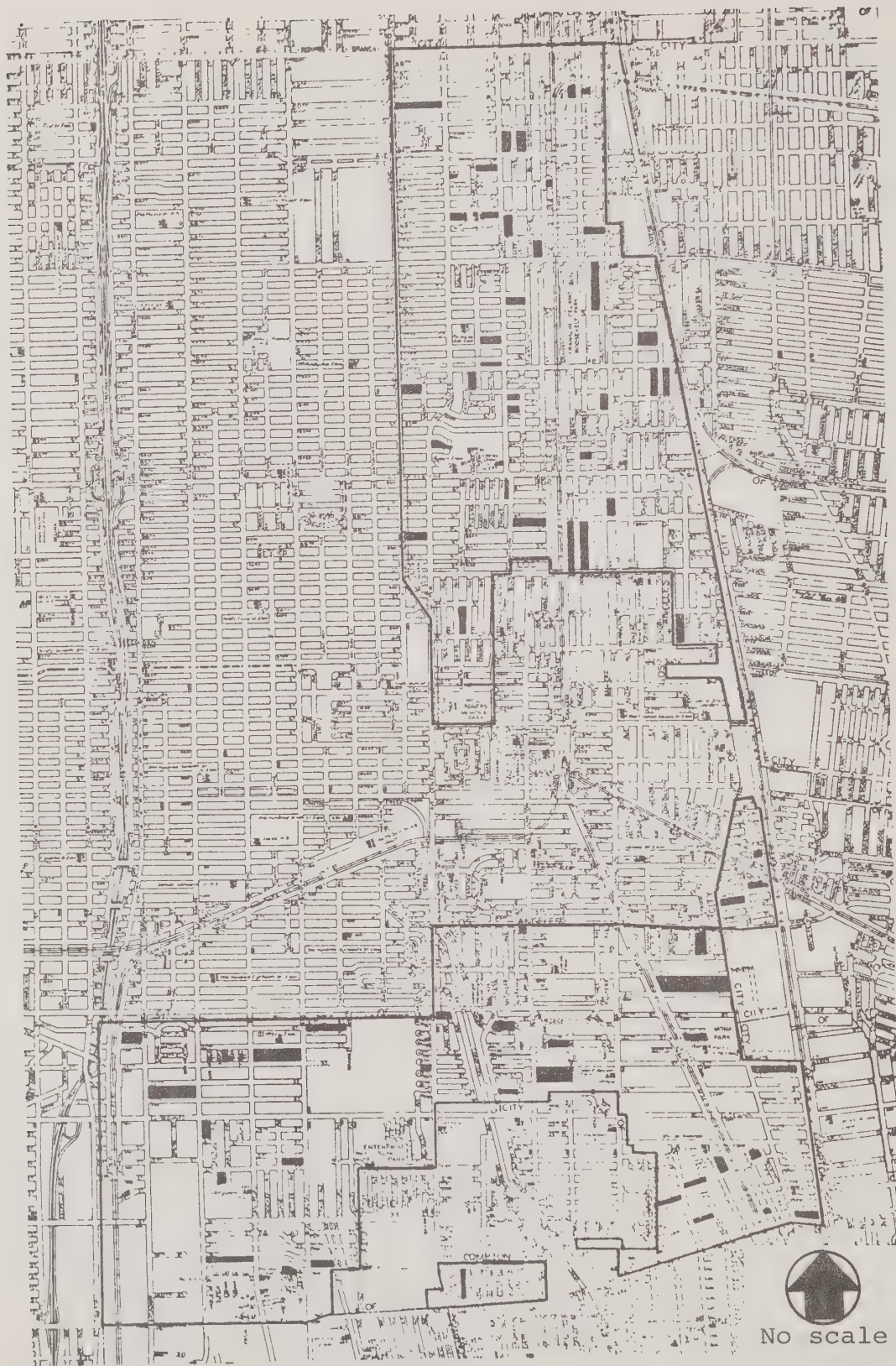
comprising the sample. Sample block locations are shown on Figure IV-4, and land use information for the properties comprising each of the blocks is tabulated in Tables IV-1 and IV-2.

A total of 1,122 properties in the Florence-Firestone community and 1,141 properties in the Willowbrook community are included in the sample.

A survey of the sample blocks was conducted in February, 1971, to determine the types and condition of waste containers presently used in the study area. The surveys were conducted by area residents trained to record the number and types of refuse storage containers placed out on collection day. Other recorded information included: the number of vacant lots on the block, the condition and type of refuse storage containers used, the occurrence of spilled refuse, and the number of containers with lids. The survey teams arrived at the sample blocks and completed their tabulations just prior to normally scheduled collection of refuse by the contractor. Maps and data forms were provided to the survey personnel to facilitate accurate recording of field conditions.

Container information was summarized and is included as Tables IV-3 and IV-4. Analysis of the tables shows that five containers were located at the average stop and nearly half were in a fair to poor condition. Contributing factors to litter are evident in refuse spillage at every tenth property location and lids on only 30 percent of the waste containers. More than half the containers used were simply paper grocery sacks or small cardboard boxes intended for disposal with their contents. The high percentage of spills was primarily attributed to animal attack and vandalism. There are a large number of dogs in the neighborhood, many of which are permitted to roam in the evening and/or night hours. The improper containers provided little resistance to animal attack. Photographs IV-1 to IV-4 illustrate typical container setouts in the study area.

Based on the average daily refuse generation rate of 2.1 lbs per capita during 1970, the 88 lbs collected at each property indicates an average of six persons contribute refuse at each storage container collection point. If the effect of the multiple dwelling units is considered, the estimated number of contributing persons is reduced. In addition, it is known that some neighbors place their trash containers together on the property line which increases the average refuse quantity per stop. RPC data presented in Chapter II indicates the average number of occupants per residence to be 3.30 for Florence-Firestone and 4.08 for Willowbrook. The amount of refuse per stop indicates nearly six persons contributing. The difference cannot be



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FIGURE IV-4

LOCATIONS OF SAMPLE
BLOCKS

TABLE IV-1

SAMPLE BLOCKS

WILLOWBROOK COMMUNITY

Geo- graph- ical unit	Block number	Lots (no.)	Single dwell- ings (no.)	Duplex (no.)	Multi- family (no.)	Vacant houses (no.)	Vacant lots (no.)	Other land use (% of total area)
1	44	25	25	--	--	--	--	--
	57	22	22	--	--	--	--	--
	9	15	8	--	--	--	--	50
	40	25	25	--	--	--	--	--
	33	14	2	13	--	--	--	6
	53	71	49	1	--	--	4	35
2	6	33	32	1	--	4	9	2
	16	31	33	3	3	--	2	--
	11	45	80	3	1	--	2	--
3	5	42	27	--	--	--	4	--
	53	58	26	--	--	--	2	17
	45	26	14	--	--	--	3	--
	7	22	19	--	--	--	1	--
	15	52	28	--	--	--	6	--
	17	34	34	--	--	--	--	--
4	35	32	29	--	--	1	2	--
	4	34	34	--	--	--	--	--
	10	15	15	--	--	--	--	--
5	14	48	9	--	--	1	8	65
	21	91	23	3	--	--	6	64
	15	60	23	8	--	--	13	56
6	67	24	24	--	--	--	--	--
	70	32	32	--	--	--	--	--
	45	32	28	1	4-6Apt.	--	--	--
	1	32	6	--	--	--	7	70
	22	12	12	--	--	--	--	--
	20	32	26	1	--	--	1	21
	52	27	25	2	--	--	--	--
	43	46	46	--	--	--	--	--
7	2	15	12	3	--	1	--	15
	17	14	14	--	--	--	--	--
	26	50	45	--	--	--	1	15
	20	50	49	1	4	--	--	18
8	3	--	--	--	--	--	--	100
	7	--	--	--	--	--	--	100
Totals		1,141	876	40	12	7	70	

TABLE IV-2

SAMPLE BLOCKS

FLORENCE-FIRESTONE COMMUNITY

Geo- graph- ical unit	Block number	Lots (no.)	Single dwell- ings (no.)	Duplex (no.)	Multi- family (no.)	Vacant houses (no.)	Vacant lots (no.)	Other land use (% of total area)
9	21	43	41	3	--	4	--	5
	47	32	29	--	--	2	4	5
	7	30	18	1	--	--	--	10
	59	28	15	--	--	--	8	--
	24	28	33	--	--	1	--	--
10	27	12	9	--	--	2	--	10
	34	29	26	7	3	--	--	12
	46	22	21	1	1	--	--	--
	21	24	31	1	1	--	--	5
	31	20	--	20	--	--	--	--
11	4	62	34	1	7	5	1	5
12	20	99	58	2	2	--	--	25
	19	72	17	1	--	--	27	30
	13	42	24	2	7	--	--	5
13	7	59	59	8	5	--	--	6
	28	16	23	1	--	--	--	--
	19	44	27	3	2	--	--	12
	29	19	14	4	--	--	3	4
14	8	17	22	2	--	--	--	2
	55	22	32	3	4	--	--	--
	47	22	29	5	--	--	--	7
	35	6	11	--	1	--	--	--
	59	23	31	3	1	--	--	5
15	19	20	30	6	1	--	--	4
	18	20	11	3	--	--	--	50
	6	52	64	4	--	--	--	5
	27	24	50	3	2	--	2	--
	14	32	33	1	--	--	--	--
16	10	47	26	2	4	--	--	6
	9	60	42	3	--	--	--	3
	41	30	11	--	1	1	--	10
	17	22	32	--	--	1	--	--
	18	24	17	1	2	1	--	6
	13	20	17	--	2	--	--	15
Total		1,122	937	91	47	17	45	

TABLE IV-3
WILLOWBROOK COMMUNITY
CONTAINER SURVEY

Geo- graph- ical unit	Blocks	Containers (no/stop)		Can condition (%) ¹			Con- tainer spills ² (%)		Lids on containers (%)		Collection location (%)	
		Cans	Items	Good	Fair	Poor	Yes	No	Yes	No	Alley	Curb
1	6	1.8	2.3	56	35	9	7	93	33	67	0	100
2	3	2.2	3.0	42	41	17	20	80	26	74	0	100
3	7	1.6	2.5	44	40	16	7	93	21	79	2	98
4	2	1.8	2.0	69	25	6	13	87	54	46	38	62
5	3	2.4	3.1	46	39	15	3	97	30	70	5	95
6	5	2.3	2.9	48	42	10	7	93	26	74	8	92
7	4	1.6	2.3	51	30	18	7	93	42	58	0	100
8	-	-	-	-	-	-	-	-	-	-	-	-
Willow- brook	30	1.9	2.6	49	37	14	9	91	31	69	5	95

NOTE:

¹Definition of can condition for survey personnel use

Good - New or used container without holes or major damage.
If lid were available, it could be put onto the container.

Fair - Used container without holes but showing evidence of use (dented, rusted, container lid may not fit properly).

Poor - Container has holes, split seam, tears, and lid would not fit because of misshapen condition.

²Container tipped over and contents partially or wholly scattered.

TABLE IV-4
FLORENCE-FIRESTONE COMMUNITY

CONTAINER SURVEY

Geo- graph- ical unit	Blocks	Containers (no/stop)		Can condition (%) ¹			Con- tainer spills ² (%)		Lids on containers (%)		Collection location (%)	
		Cans	Items	Good	Fair	Poor	Yes	No	Yes	No	Alley	Curb
9	5	1.6	2.2	57	26	17	7	93	28	72	0	100
10	5	2.1	2.6	62	16	23	2	98	62	38	6	94
11	2											
12	3	1.5	1.9	58	32	10	8	92	28	72	4	96
13	4	2.4	3.1	59	26	15	17	83	49	51	0	100
14	7	2.3	3.0	55	34	10	2	98	27	73	21	79
15	3	2.7	3.6	66	25	9	5	95	37	63	0	100
16	6	2.3	3.1	43	43	14	24	76	25	75	0	100
Florence-35 Firestone		2.2	2.8	56	30	14	10	90	35	65	5	95

NOTE:

¹Definition of can condition for survey personnel use

Good - New or used container without holes or major damage.
If lid were available, it could be put onto the container.

Fair - Used container without holes but showing evidence of use (dented, rusted, container lid may not fit properly).

Poor - Container has holes, split seam, tears, and lid would not fit because of misshapen condition.

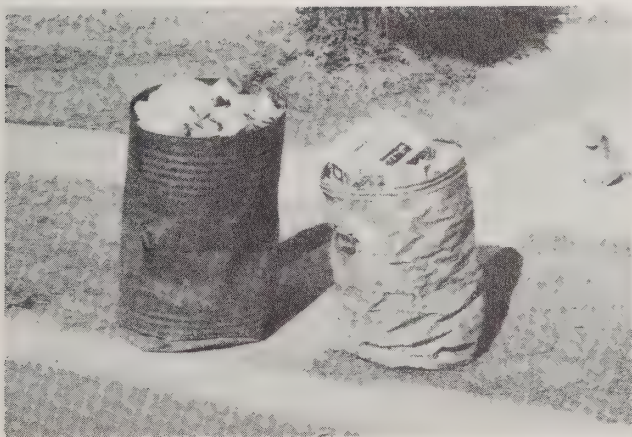
²Container tipped over and contents partially or wholly scattered.



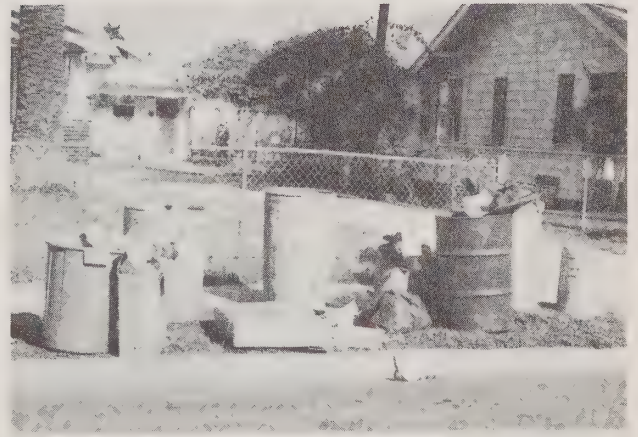
Photograph IV-1
Improper Containerization



Photograph IV-2
Emptied Storage Barrels



Photograph IV-3
Damaged Containers



Photograph IV-4
Container Set-Out

completely explained, but it is known that some property owners in the area have added rooms and converted garages to facilitate housing a relative or second family at the same location. Thus, the number of persons contributing refuse at an average collection stop is probably over four and under six.

B. Cleanup Campaign

In accordance with the FGDD contract, an annual cleanup campaign was conducted in April and May, 1971. The campaign was widely publicized and gave residents the opportunity to discard all types of accumulated trash and bulky items in unlimited amounts.

Collections were made beginning at 7 a.m. on the four Saturdays of April and the first Saturday of May. Publicity for the campaign was provided by the contractor with approval of the County Health Department. A description of the campaign, including a map of the areas to be included on each designated Saturday, was published in the local newspapers and sent by mail to all residents of the District. The announcement indicated the materials which could be placed at the curb for pickup, the collection day for the resident, and a telephone number for questions regarding the campaign.

Each Saturday area designated for the cleanup campaign coincided with that of one of the regular daily collection areas. For example, the normal Monday collection area was designated for special cleanup on the first Saturday of the campaign.

The procedures used by the contractor during the campaign were monitored during two Saturdays. The foreman in charge was interviewed, photographs taken, and observations made. Prior to starting the Saturday collection, the field foreman made a visual inspection of the area to be serviced. The amount of refuse was estimated to help determine equipment and manpower requirements and assign routes to the collection trucks.

A central field dispatching station was used to facilitate allocation of men and equipment. In addition, two foremen with radio cars were in the field to coordinate cleanup activity. Regular collection trucks, front-end loaders, and roll-off containers were used during the campaign. Twenty to thirty extra laborers were hired by the contractor to assist in the operations. Initially, the back doors of the regular collection trucks were opened and items loaded into the back of the truck. When this procedure became too difficult, the doors were closed and the materials loaded into the hopper for compacting into the truck body. Items

too large for the regular collection vehicles were left behind for follow-up collection by a front-end loader or a roll-off bin.

The large roll-off containers were lowered to the street and pulled on their rollers by the truck. Initially, the back gate was opened and men walked in to load bulky items into the container. When the container began to fill, the back doors were closed and the waste material was loaded over the side. Photograph IV-5 shows a roll-off bin being used during the campaign.



Photograph IV-5
Cleanup Campaign

The front-end loaders were used both with and without bins. Some large objects, such as couches, were handled directly with the forklift mechanism. Smaller items, such as brush, logs, and chairs, were first loaded into the bin and then the bin unloaded into the vehicle. Photographs IV-6 and IV-7 illustrate a front-end loader in operation.

When practical, both sides of a street were collected with one pass of the equipment. When a container or truck was full, the laborers returned to the assembly area. The truck continued to the disposal site while the laborers were placed on another truck to continue work.



Photograph IV-6
Front-End Loader



Photograph IV-7
Front-End Loader

Material of every description was placed at the curb for collection as illustrated in Photographs IV-8 to IV-12.



Photograph IV-8
Cleanup Campaign Set-Out



Photograph IV-9
Cleanup Campaign Set-Out



Photograph IV-10
Cleanup Campaign Set-Out



Photograph IV-11
Cleanup Campaign Set-Out



Photograph IV-12
Cleanup Campaign Set-Out

Some of the most common items were couches, tables, chairs, tree trunks, limbs, mattresses, box springs, and other assorted furniture. Large amounts of lumber were also common. Very few metallic objects, such as refrigerators and stoves, were seen. Most of these, plus other potentially valuable items, had been removed by private scavengers prior to collections by the contractor. Several private scavengers were also observed collecting mattresses, presumably for the cotton content.

In order to minimize traffic interference, the collection along heavily traveled streets was completed first. Observations showed that collections were completed in an efficient and sanitary manner. Table IV-5 presents a summary of personnel and equipment usage during the 1971 cleanup campaign

TABLE IV-5

1971 CLEAN-UP CAMPAIGN

Date	Equipment Used				Manpower		Tons	Collection Hours
	Shu-Pac	Front Loaders	Roll-Offs	Total	Drivers	Swampers		
April 3	12	14	6	32	32	16	190	6-3:30 p.m.
April 10	11	6	6	23	23	23	116	6-3:00 p.m.
April 17	11	12	7	30	30	22	207	6-4:00 p.m.
April 24	12	20	7	39	39	32	322	6-4:30 p.m.
May 1	12	15	6	33	33	30	323	6-5:00 p.m.

during which a total of 1158 tons of material were collected. On an average Saturday, 55 men and 31 collection vehicles were engaged in the campaign.

The large quantities of material collected clearly indicate that routine collections of bulky materials during the year should be given increased emphasis. Apparently, many residents are unaware that bulky wastes can be collected at any time provided a call is made to the contractor or the Health Department. This is true despite diligent efforts on the part of the contractor and Health Department Sanitarians to disseminate the information. Increased efforts to educate the residents of the service availability is needed. Additional newspaper articles, mailers, and announcements can be used for this purpose.

C. Los Angeles County Road Department

The Department is responsible for study area street cleaning and has been conducting alley and parkway cleanup work using county relief personnel. It also places and maintains sidewalk litter containers in the area.

All streets in the neighborhood are swept a minimum of once weekly during posted hours. In general, there was good correlation between the day of refuse collection and the day of street sweeping. Field observations of street, alley, and parkway cleaning activities of the Department were completed and photographs of work activity obtained.

Effective street cleaning is necessary to keep any urban area sanitary and neat in appearance. If streets are not regularly cleaned of dirt and litter, the quantity of accumulated waste can be substantial. The principal factors governing the operation and administration of a street cleaning service are the character and quantity of street refuse, climate, traffic, parking, and condition of street paving.

The two common methods for street cleaning are manual and with powered street sweepers. The latter method is the most efficient for paved areas. The street sweepers collect the swept refuse materials for subsequent loading into a dump truck for transport to the disposal site. Most mechanical sweepers use a water spraying mechanism to control dust during sweeping.

Some locations in the study area require manual cleaning because of lack of curbs and/or poor paving conditions. These areas are cleaned manually using county relief personnel. About 100 miles of asphalt gutter in the study area pose a problem; these deteriorate rapidly and are difficult to clean effectively with street sweepers. Other problems arise when

parked cars prevent effective cleaning of the street. Although the entire study area is posted for weekly two hour street sweeping periods, cars frequently park illegally and obstruct the sweeper. The sweeper works around these cars and continues on with little lost time. Because cars are rarely parked illegally in the same space in two consecutive sweeping periods, the sweeper usually cleans the area the next time around. However, loose litter under the parked cars is often scattered by the wind or by traffic before the next sweeping is scheduled. These litter materials continually degrade the neighborhood appearance.

The Department uses three mechanical sweepers in the study area to sweep an estimated 270 miles of curb and gutter each week. The average number of curb miles completed daily per sweeper ranges from 35 to 40. Mechanical street sweepers usually operate effectively at speeds between 4 and 8 mph. The actual distance traveled by a sweeper will depend upon the amount of traffic congestion and the quantity of litter contained on the paved areas.

Photograph IV-13 illustrates the type of street litter removed by the sweepers.



Photograph IV-13
Typical Street Litter

Visual sampling of the material indicated that approximately 70 percent was paper, 20 percent vegetation, and the remaining 10 percent dirt and miscellaneous debris.

Each sweeper daily picks up from four to six loads of street litter, with each load comprising 2 to 3 cu yds.

Collected materials are transported to a local Department District yard for interim storage prior to final disposal.

Based on discussions with sweeper operators and administrative personnel, accumulation of trash and refuse in the street is a major problem for the sweeping operation. These materials primarily result from the following three sources listed in order of decreasing contribution.

- Undersized refuse storage containers (especially at apartments)
- Use of illegal refuse storage containers (cardboard boxes, grocery bags, etc.)
- Spillage of refuse prior to or during the collection process

Street cleaning operations are materially influenced by the character and condition of paving. Pavements in good repair enable more efficient and effective street cleaning operation. Crevices or cracks in the pavement trap and retain dirt and debris, and wind can scatter this material.

Traffic congestion in some locations require that street sweeping be scheduled during off hours in order to be effective. Daytime street sweeping operations can be completed in areas where traffic and parking are light.

The Department removes about 25 cu yds of street dirt and litter daily from the study area at an annual cost of approximately \$75,000. This cost includes sweepers, dump trucks, and labor for operation. Operating costs of sweepers average about \$10 per hour including labor.

Comparison of Figures III-2 and III-3 in Chapter III indicates a fair correlation in scheduling refuse collection and street sweeping. Exceptions are certain areas in the Willowbrook community. However, the time during the day when refuse collections are made and the corresponding times for street sweeping should be better coordinated. Some means of cleaning inaccessible and difficult to clean areas should also be considered.

Litter containers in the study area are placed at points where litter has accumulated in the past. These have included areas of heavy pedestrian traffic such as bus stops, neighborhood markets, schools, and parks. Public complaints also assist in identifying locations for litter containers. The number of litter containers in the area has nearly doubled in recent years upon request of a County Supervisor.

Two basic types of litter containers are presently used in the Model Neighborhood. The older type is an enclosed container with flip-open doors and a metal mesh liner. The newer type is a wire basket with an open top. The wire basket type is gradually replacing the closed metal containers for the following reasons:

Economy - Wire basket containers cost about \$25 each, whereas each enclosed container costs nearly \$60.

Durability - Experience has shown the wire basket container to be less susceptible to wear and tear.

Maintenance - Wire basket containers require less maintenance.

Ease of Accepting Litter - It is more convenient for pedestrians to deposit litter into an open-top container.

Approximately 30 percent of the litter containers in the study area were inspected during a field survey. The contents and condition of each container were noted and land use adjacent to the container noted. About 90 percent of the litter containers inspected were of the older rectangular type.

Many were found in need of painting and/or repair. Approximately one-third had problems with the swinging doors, and one-fourth had tops missing or bent out of shape. Most of the liners were in good condition.

The litter containers contained primarily paper and paper by-products. Minor amounts of spoiled food, liquids, glass, and plastics were also noted. Two-thirds of the containers were in commercial areas. The remainder were in or near residential areas.

D. Forester and Fire Warden

This Department has present responsibility for cleaning 705 vacant lots in the study area. A previous survey indicated there were over 1000 vacant lots in the study area. Many were absorbed by the State Division of Highways as part of freeway right-of-way acquisition for the Century Freeway. The state is responsible for maintaining this right-of-way in a clean condition. However, the County has occasionally found it necessary to clean up state owned lots.

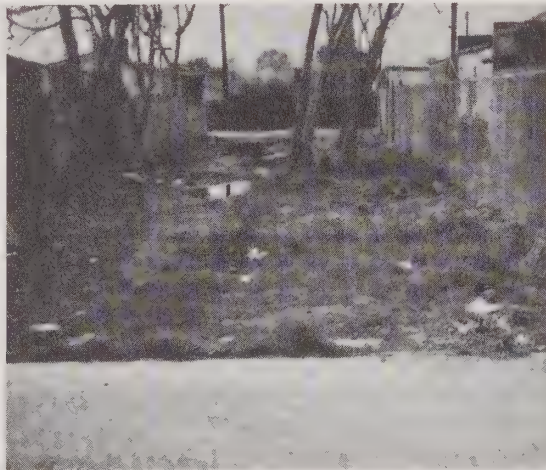
The vacant lot cleaning program has been conducted primarily to reduce fire hazards. The Department reported that

during the period from July 1, 1968 to June 30, 1969, a total of 703 fires occurred in the study area that were traced to trash and rubbish accumulations outside of structures. The number for the similar period in 1969-70 was 690. The expanded lot cleaning activities are expected to reduce fires to lower levels. Lots were cleaned an average of twice each year with the cost borne by the property owner. The owner was first given the opportunity to provide privately for cleaning if he desired. The new lot cleaning program being assisted by federal funds has permitted lot cleaning frequency to be increased from two to four times annually. Cleaning activity is conducted year around, however, discing for weed control is scheduled with the growing season to be most effective. Most trash must be removed from the lot before discing with a tractor can be accomplished.

Under normal conditions there are two crews assigned to the weed abatement program. The first crew is composed of a supervisor plus a foreman and nine workers. Under the federal assisted program, the foreman and the nine workers must be area residents. Hand tools are used for the cleaning work. A second crew composed of a foreman and three workers, also area residents, work with shovels and rakes to load trash into a front-end loading truck. The first crew cuts the weeds and accumulates the trash into piles for loading by the second crew into the collection truck. Photographs IV-14 and IV-15 illustrate trash accumulated on two lots. These lots had been cleaned about 2 months earlier. Photograph IV-16 illustrates a crew member working to pile vacant lot trash.



Photograph IV-14
Littered Vacant Lot



Photograph IV-15
Littered Vacant Lot



Photograph IV-16
Lot Cleaning

About two full loads of trash are gathered daily. During a ten-day monitoring period in January of 1971, cleaning crews removed over 83 tons of trash from vacant lots.

At the time of the survey the dumping location was at the Los Angeles County Sanitation District disposal site in Palos Verdes. The roundtrip distance to this site required 80 to 90 minutes. In March of 1971, the county took delivery on two rear loading packer trucks for use on the project.

Discing of the trash cleaned vacant lots for weed control is done by private contractors. The first annual discing is completed during the period from April 1 to July 1. Two tractors are used during this time. After July 1, only one tractor is kept busy for a 1 1/2 to 2 month period to cover missed lots and to catch new growth. By September all discing is completed and the vacant lots are in good condition.

Annual costs of discing and lot cleaning averages about \$20 to \$25 per lot according to Department representatives. The present concentrated effort is intended to maintain the lots in a clean condition, on the theory that a clean lot will attract less trash than one already strewn with litter or overgrown with weeds. The overall effect of the weed abatement program appears to have made a marked improvement in area appearance.

E. Animal Control

As previously noted, loose animals in the study area are cited as a major cause for spilled refuse at the collection

point. In September of 1970, the Los Angeles County Department of Animal Control commenced a special program to properly license and control loose animals in the study area. The program receives financial assistance from the Federal Government through the Model Neighborhood Program. Two animal control trucks equipped with radios operate in the area during working hours. During the first six months of the program, over 2,000 dogs and 118 cats were collected, over 300 warnings were given, 993 dead animals were recorded, and more than 3,000 service requests were received.

The number of animals in the study area represents a significant problem. Many are permitted to roam at night and forage for food. Improper refuse containers containing unwrapped garbage provide an attractive target for these animals. The expanded animal control program appears to be obtaining results and should be continued until a more normal situation is achieved. Although operations of animal control trucks at night in the area result in problems of safety, some means of policing stray animals during nighttime hours should be sought. Concentration of animal control activities in daily refuse collection areas would be productive in reducing both container spills and the number of loose animals.

CHAPTER V

MODEL NEIGHBORHOOD RESIDENT QUESTIONNAIRE

A. Purpose

As an integral part of the community public information program, and to initiate steps to obtain community support for the future demonstration program, a detailed questionnaire was formulated and administered to citizens residing in the 69 sample blocks of the study area.

The questionnaire, included as Appendix A, was designed to: determine attitudes of area residents regarding existing waste storage and litter problems; establish priority problems of waste management as perceived by the residents; and provide information regarding the present use of waste storage containers, garbage grinders, and other information pertinent to the initiation of a future demonstration program to improve solid waste management and litter control.

B. Formulation and Review

The questionnaire was carefully designed for use by area residents in conducting personal interviews. A draft questionnaire was first prepared and reviewed with Model Neighborhood Program staff and with the Willowbrook and Florence-Firestone community councils. At the community council meetings, the program and questionnaire purpose was explained to community residents. A question and answer period allowed residents to comment on the content of the questionnaire and on problems they experienced with solid wastes. Employment opportunities for area residents to serve as interviewers were explained and names of interested persons obtained.

C. Distribution Areas and Method

A team of interviewers was subsequently assembled and trained for the work. Nineteen persons were hired following careful screening. Each was given instruction and training in the distribution and completion of the questionnaire, and provided with coded questionnaires for use. Instruction was given on the proper procedure for completing the questionnaire and for interpreting remarks of the interviewee. Each interviewer was provided a map of the sample block to which he was assigned, showing the location of each residence and a proposed path of travel to ensure each residence in the study block was canvassed.

Interviews were completed with 1121 householders during the period February 19-27, 1971. Each interview required approximately 30 minutes to complete. Completed questionnaires

were carefully screened and checked by supervisors and unclear or incomplete questionnaires rejected. The 1025 accepted questionnaires represented nearly a 5 percent sample from the study area.

D. Questionnaire Analysis

The questionnaire was designed for computer analysis. The response to each question by community as well as for the total study area was tabulated and is presented as Appendix II to this report. Additional computer analysis to determine question responses of those citizens classified as owner or renter, short-term or long-term area residents, over 40 years of age versus under 40 years, and by sex of the respondent was also completed. Results indicated that in certain instances there were important differences between residents residing in the communities of Florence-Firestone and Willowbrook. These differences are identified where they appear.

E. Results

A great quantity of data is generated by computer tabulation of over 1000 questionnaire responses. No attempt is made here to present the results of each question and the effect of all variables upon the results. The reader is referred to Appendix B for this detailed information. The study team has, however, thoroughly reviewed the questionnaire results and has identified significant responses in the following areas of interest:

- Litter perception
- Degree of objection to litter
- Cause of litter
- Opinion and knowledge of present collection service
- Container characteristics and garbage grinder prevalence
- Willingness to participate in a demonstration program

Each of these areas of interest are discussed below.

Litter perception by residents was high. Between 70 and 80 percent indicated they noticed litter in streets, alleys, and vacant lots. Litter around commercial buildings was perceived as less of a problem though approximately half of the residents indicated noticing litter near commercial buildings.

Residents' perception of the degree of litter was measured in three contexts: their immediate neighborhood; the Willowbrook/Florence-Firestone area; and their neighborhood when compared to the larger community. In all three contexts,

Florence-Firestone residents consistently reported seeing greater amounts of litter than did Willowbrook residents. For example, Florence-Firestone residents were more likely than Willowbrook residents to rate their neighborhood as having the same or more amounts of litter in comparison to the whole community.

The degree of objection to litter varied, but overall between 60 and 70 percent of the residents indicated that litter in yards, streets, vacant lots, and alleys bothered them to a considerable degree. The identification of litter as bothersome varied by community. Florence-Firestone residents were bothered to a greater degree by the litter levels in their neighborhood than were Willowbrook residents. This result is not surprising since the Florence-Firestone residents had a higher perception, or awareness, of litter. In both communities, however, it was noted that owners and long-term residents were bothered more by litter than were renters and short-term residents. In Willowbrook, 20 to 35 percent more owners and long-term residents stated they were bothered by litter than did renters and short-term residents. A similar, though less pronounced, trend is evident in the Florence-Firestone community. Residents noted that discarded bulky items caused general community unsightliness, provided harborage for rats, mice, and other pests, and dangerous play areas for children.

Comparison of all responses between the two communities indicates more concern with litter in Florence-Firestone, an area already characterized as having a greater litter problem. The fact that Florence-Firestone residents are significantly bothered by present conditions suggests they would strongly support a demonstration program to improve litter conditions.

Residents were asked to identify the major cause of litter in their neighborhood. Of importance in deciding upon future demonstration efforts is that 47 percent of the combined sample identified people as the major cause of neighborhood litter. This suggests the public information campaign should include educational as well as "hardware" litter reduction strategies.

Respondents who identified people as the major cause of litter were further asked to identify these people and why they littered. Typical responses follow (listed in order of frequency from highest to lowest):

- Irresponsible, careless residents who lack community pride
- Passers-by tossing litter from cars
- Young people who are not taught community responsibilities

- Lazy persons
- Owners who do not maintain their property
- Insufficient number of trash receptacles
- Drunk persons

Concerning present methods and practices of refuse collection in the area, the questionnaire clearly indicated the need for more effective information dissemination to residents describing the services presently available to them. Ten percent of those interviewed indicated that they were unaware of the schedule for their refuse collection. Well over 40 percent indicated they did not know when bulky waste items could be placed at the curb for collection. Although garbage collection is provided in the area on a twice weekly basis, only 12 percent knew this was the case. Fewer than 25 percent of the residents knew that bulky items could be picked up at any time simply by telephoning the private collection contractor. Nearly 97 percent of the respondents felt that rubbish collection service was either free or did not know the present cost.

Approximately 80 percent felt that rubbish collection service was provided often enough. Ninety percent felt that garbage collection provided on a once per week basis was sufficient. Respondents who wanted more frequent rubbish and garbage collection service gave reasons such as excess refuse, large families generated greater quantities of refuse, lack of adequate storage containers, odor and fly problems with garbage, and general unsightliness in the community.

A slight community difference appeared in that more residents in Florence-Firestone than Willowbrook were bothered by waste storage containers at the curb on collection day. This is consistent with the previous finding that neighborhood litter is more bothersome to Florence-Firestone residents.

Questions were asked regarding refuse container characteristics and prevalence of garbage grinders. Many more sink garbage grinders were installed in the Willowbrook area than in the Florence-Firestone area--30 percent versus 12 percent respectively. This reflects the relative age of buildings in the communities. In both communities, 30 percent more younger persons (under 40) had garbage grinders than the older group. More owners than renters had garbage grinders in the Willowbrook community.

By a ratio of 3:1, respondents under 40 years of age indicated they experienced more problems in storing garbage and rubbish between days of collection than the over 40 group.

Slightly less than half the residents in each area have purchased plastic trash bags; about 50 percent of the purchasers report using the bags regularly. It was noted that more younger people (under 40) in the Florence-Firestone area used the bags regularly, whereas in Willowbrook, more older persons used the bags.

Residents were asked several questions to measure their willingness to engage in various activities to help improve waste management and/or to alleviate the litter problem. When asked if they would separate their trash for recycling purposes, 65 percent in Willowbrook and 55 percent in Florence-Firestone said they would do so. Owners and long-term residents were more favorable toward recycling than renters and short-term residents, and this finding explains why residents in Florence-Firestone were less interested in recycling. The age factor overshadowed the greater concern for litter in the Florence-Firestone community than in Willowbrook.

Among those who would separate their trash to help solve the litter problem, only 19 percent in Willowbrook and 17 percent in Florence-Firestone would be willing to take glass, cans, and/or newspapers to special collection locations. Of this group, the majority in both communities would go to a central collection location in their immediate neighborhood. More residents in Florence-Firestone appear willing to go to reclamation centers outside their neighborhood, but within the general community. Few in either community would go to centers outside the Willowbrook/Florence-Firestone area.

Information on age, sex, dwelling status (own or rent), dwelling type, length of residence, and area of residence before moving to Willowbrook/Florence-Firestone were gathered from the resident sample. Community differences are greatest for sex and dwelling status: women make up a greater proportion of the Florence-Firestone sample as do renters, as opposed to homeowners. In addition, slightly more residents in Florence-Firestone report residing there less than one year. The age distribution of both communities samples is comparable as are the percentage of those in single-family rather than multiple dwelling units.

An independent survey of senior citizens (over 55 years of age) residing in the Model Neighborhood was administered by the Gerontology Center of the University of Southern California. This survey covered a wider range of subject matter than the solid waste and litter questionnaire previously discussed. However, several questions on the Gerontology Center questionnaire pertained to litter control and solid waste problems. Senior citizens were asked: Do any of the following give you

a problem in your neighborhood? Responses are presented in Table V-1. (Only those responses relating to solid waste and litter control are shown.)

TABLE V-1

NEIGHBORHOOD PROBLEMS FOR SENIOR CITIZENS

Question Area	Importance Rank	Yes	No	Why
Trash	12	21%	30%	Vacant lots and streets
Vacant Lots	7	29%	22%	Trash or weeds
Rodents	11	22%	29%	Too many
Animals	5	37%	25%	Running Loose
Odors	18	15%	32%	Commercial-industrial
Noise	9	24%	35%	Traffic, children, teenagers

Food prices and property taxes (not shown) were identified as the most important problems by this question. Note also that loose animals were an important problem to these citizens.

Another question asked was: What do you think about sanitation services? Responses are tabulated in Table V-2. While nearly two-thirds indicated overall sanitation services were good, less than one-half thought trash removal from vacant lots was good. Street cleaning and garbage collection services were rated good by three-fourths of the respondents.

TABLE V-2

SENIOR CITIZENS' RATING OF
SANITATION SERVICES

Question Area	Rating		
	Good	Fair	Poor
Sanitation Services	62%	27%	11%
Street Cleaning	74%	21%	4%
Garbage Collecting	76%	20%	4%
Trash Removal from Vacant Lots	45%	23%	32%

CHAPTER VI

CRITERIA FOR SOLID WASTE MANAGEMENT SYSTEM SELECTION

A primary objective of the Model Neighborhood Program is to improve the environmental quality in the study area. Environmental quality improvement involves complex physical, social, and economic factors, many of which are interrelated. Improvements measured in terms of reduced costs, for example, may have an adverse effect upon physical or social factors.

A. Criteria Listing

Through discussions with social scientists, engineers, and area residents, and following a review of program goals and objectives, a listing of desired criteria for the waste management system was formulated. The criteria recognize many of the social, physical, and economic constraints inherent in the study area, and those which may emerge when modifications to the present waste management system are made. The waste management system criteria are presented below:

- Reduce neighborhood litter
- Reduce costs for residential waste management
- Provide employment for area residents
- Improve esthetics (exclusive of litter effects)
- Convenient for householder use
- Facilitate combined collection of trash and garbage
- Adaptable for use by collection contractor
- Demonstrable (readily demonstrated in the study area)
- Resist animal attack
- Acceptable to owners and renters alike
- Reduce street, vacant lot and alley cleaning
- Capable of future modification
- Reliable and proven
- Implementable (readily implemented in the study area)
- Self-sustaining (continued Federal Assistance unnecessary)
- Improve community pride
- Reduce health hazards
- System components known to residents

B. Ranking

Persons consulted in the preparation of the criteria listing were requested to rank the criteria in order of importance. This ranking was done with knowledge of the study area physical and social conditions as determined from the field studies and resident questionnaire analysis. The procedure followed in ranking the criteria was to select the most important criterion and assign it a value of 10. Next the least important criterion was selected and assigned a value of 1. All other criterion

were then ranked in relation to these two reference points, using a scale of 1-10. The rankings of each individual are presented in Table VI-1 below. It is important to note that Table VI-1 shows only each individuals' ranking and is not an attempt to define overall ranking.

TABLE VI-1
RANKING OF SYSTEM CRITERIA

Individual					System Criteria
A	B	C	D	E	
10	6	10	9	5	Reduce litter
8	4	9	4	2	Reduce costs
9	6	4	6	3	Provide employment for area residents
4	6	8	9	6	Improve esthetics (exclusive of litter effects)
8	8	7	7	8	Convenient for householder use
6	3	3	6	5	Facilitate combined collection of trash and garbage
8	5	3	8	8	Adaptable for use by collection contractor
10	10	7	7	10	Demonstrable (readily demonstrated in the study area)
2	7	6	6	9	Resist animal attack
8	8	9	8	9	Acceptable to owners and renters alike
5	1	6	5	5	Reduce street, vacant lot and alley cleaning
6	4	6	5	4	Capable of future modification
6	1	5	1	2	Reliable and proven
10	10	7	10	9	Implementable (readily implemented in the study area)
5	4	4	6	9	Self-sustaining (continued Federal Assistance unnecessary)
4	8	6	9	10	Improve community pride
9	8	10	8	7	Reduce health hazards
1	4	1	8	1	System components known to residents

Criteria with equal ranking were considered to be of equal importance by the persons completing the ranking.

The criteria were utilized in the final selection of the recommended solid waste management system for demonstration in the study area as subsequently described in Chapter VIII.

CHAPTER VII

ALTERNATIVE SOLID WASTE MANAGEMENT SYSTEMS

A. Identification of Alternatives

The previous chapter has identified desirable criteria in the waste management system to be demonstrated in the study area. This chapter will identify alternative systems for consideration. Each will satisfy the criteria to a different extent. Ten alternatives were identified for analysis. To facilitate system description only the significant aspects of each will be described. Common elements for each alternative are described at the end of Section A.

Alternative I - Household Refuse Compactor

Several models of kitchen refuse compactors have been recently introduced on the market for home use. These units appear similar to a kitchen dishwasher from the exterior, although somewhat smaller, and are installed under the counter. Household refuse is compacted into a paper bag within the unit. The bag is disposed with contents in a similar fashion to conventional disposable refuse bags.

Alternative II - Sink Garbage Grinders and Conventional Containers

The familiar kitchen sink garbage grinder facilitates sanitary disposal of table scraps and other wet garbage. This alternative was considered because of the high incidence of animal attack and the low numbers of grinders in use in the study area. Conventional containers would be used for refuse storage.

Alternative III - Disposable Trash Bags

Plastic and/or paper bags for refuse storage are receiving considerable marketing effort at the present time. A significant percentage of study area residents are using bags now. Their consideration as a viable alternative to cans is obvious.

Alternative IV - Use of Conventional Metal and/or Plastic Waste Storage Containers

The problem of inadequate numbers of proper waste storage containers was identified during the field survey work. This alternative would provide each resident with a sufficient number of containers to contain residential combined refuse materials.

Alternative V - Separate Collections of Residential Waste for Salvage Using Disposable Bags

Portions of the household solid waste stream determined to have market value would be segregated by the householder in the home and placed in separate containers. Conventional containers would be replaced with disposable bags as described under Alternative III above. The salvaged materials would be separately collected for transport to a recycle center or manufacturing plant.

Alternative VI - Twice Weekly Collection Service

In some areas of the U. S., residential collections are provided twice or even three times each week. Applicability of this to the study area was considered possible. Existing containers would be used for waste storage, since storage requirements are less with more frequent collection.

Alternative VII - On-Property Collection Service Using Disposable Bags

Collectors in some locations go on-property to the container storage location and carry out the refuse to the collection truck. The householder is thus not required to carry containers and refuse to the curb or alley location and retrieve the emptied containers after collection. Disposable containers help reduce the costs of this method.

Alternative VIII - Twice Weekly Collection Service with Conventional Container Replacement

This alternative is identical to Alternative VI except residents would be provided with new metal or plastic storage containers.

Alternative IX - Semi-Automated Container Lift System

Several variations of mechanical and hydraulic container lift devices using larger standardized containers to reduce collector workload have been developed in recent years. These systems were considered for the study area conditions.

Alternative X - Semi-Automated Container Lift System and Separate Collections of Residential Wastes for Salvage

This is a combination of Alternative IX and V and includes householder separation of salvageable wastes for separate collection and sale.

The alternatives identified above relate primarily to the management of waste originating from households and contiguous yard areas. Litter found on streets and parkways, alleys, and vacant lots must also be properly managed to effect environmental improvement. The proper management of household wastes will, of course, reduce the incidence of litter occurring at these other locations. For example, proper containerization of household refuse will reduce spillage in the storage area and at the collection location (curb or alley). Even so, the information gathered clearly indicates that continuing efforts directed toward improved cleaning of streets, alleys, vacant lots, and sidewalks will be required. The expanded programs being conducted by the Los Angeles County Road Department and the Forester and Fire Warden Departments form an integral part of the solid waste management demonstration system and are assumed to continue during the demonstration period. Success of the waste management system will enable gradual reduction in vacant lot and alley cleaning activities to a more normal level. However, continued supplementary street sweeping and sidewalk litter container collection activities will probably be required for an indefinite time in the future.

B. Advantages and Disadvantages

As an integral part of the selection of the recommended demonstration system, a listing of the readily apparent advantages and disadvantages of each of the alternative systems was prepared. The listing was based upon knowledge and experience of the consultant's staff, a limited literature review to locate specific application experience on certain alternatives, and preliminary economic analysis of the system superimposed on study area conditions. The advantages and disadvantages are briefly described below for each alternative.

Alternative I - Household Refuse Compactors

Advantages

- Reduces volume of refuse
- May enable refuse contractor to use less expensive, noncompacting trucks
- Reduces litter resulting from storage container spills
- Collection efficiency improved
- Would enable combined refuse collection once per week
- Because of high bag costs, residents may reduce purchases of disposable items
- Could hire and train area residents for unit installation

Disadvantages

- High initial cost (\$200 or more), plus installation of \$25

- Space in kitchen required
- High operating cost (bags cost 30 cents each, plus power). Repair history unknown
- Disruption to home during installation
- May require additional electrical capacity in older homes
- Will not accept all residential refuse materials
- Discourages segregation for salvage
- Unproven
- Will not provide continuing employment for area residents
- Probably not compatible with transient area and high proportion of renters. Theft possibly a problem
- Ownership a question
- Unit may be a source for odors in the home
- Difficult to coordinate installation with absentee owner
- May require amendments to the collection contract

Alternative II - Sink Garbage Grinders

Advantages

- Could hire and train area residents for grinder installation
- Would enable combined refuse collection once per week reducing cost
- Established status symbol
- May reduce litter by lowering the incidence of animal attack
- Improves visual esthetics of the community
- Reduces odors and health hazards from flies
- Acceptable to refuse collection contractor
- Proven method

Disadvantages

- High initial cost (\$25 plus installation of \$50 or more)
- May require additional electrical capacity in older homes
- Disposes of only a small portion of the total waste load
- May aggravate area sanitary sewer problems
- Disruption to home during installation
- Theft a possible problem
- Difficult to coordinate installation with absentee owner
- Will not provide continuing employment for residents
- Replacement of defective or worn out grinders costly and difficult to administer
- May require amendments to the collection contract

Alternative III - Disposable Trash Bags

Advantages

- History of high public acceptance
- Little or no capital investment required by householder
- Acceptable to refuse collection contractor

- Employment opportunities for bag distribution work
- Reduces litter resulting from storage container spills
- Would enable combined refuse collection once per week
- Improves esthetics of the neighborhood
- Could facilitate experiments with salvage
- Reduces noise of collection operation
- Collection efficiency may be improved
- Amendments to collection contract probably not required

Disadvantages

- Would expect a high incidence of animal attack (less with plastic than with paper bags)
- Bag distribution to residents required
- Biodegradability of plastic a possible ecological issue
- May increase number of items placed for collection
- May not replace need for hard containers for some refuse types
- Some increase in cost expected
- Care in use of bags needed (education problem)
- Bags require holder or conventional container for support

Alternative IV - Use of Conventional Metal and/or Plastic Waste Storage Containers

Advantages

- Acceptable to collection contractor
- Would reduce litter problem
- Proven method
- Improves visual esthetics of neighborhood
- Would not require renegotiation of collection contract

Disadvantages

- Difficult to enforce proper container use
- Theft of new containers a problem
- Could be opposed by local commercial business if containers provided by others
- Indigent persons may refuse to purchase containers
- Capital investment required for initial container replacement
- Will not provide continuing employment for area residents

Alternative V - Separate Collections of Residential Waste for Salvage Using Disposable Bags

Advantages

- Employment opportunities created for area residents
- Income could be used to reduce tax rate in the FGDD

- Little or no capital investment required
- Could integrate well with the pending city of Los Angeles Reclamation Center concept
- Disposable bags have history of high public acceptance
- Community organizations could be involved in project
- Reduces noise of refuse collection
- Salvage fits well with current interest in ecology
- Effective at reducing street litter problems
- Study area location close to markets for salvage materials
- Improves visual esthetics of neighborhood

Disadvantages

- Uncertain market for salvaged items
- Animal attack on bags
- Possible low status associated with work on salvage of refuse
- Bag distribution to residents required
- Requires householder cooperation in segregating trash
- More complex and thus increasing the chances of failure
- May require separate collections on more than one day
- Unauthorized persons may pick up salvage materials
- Care in use of bags required (education problem)
- Ownership of salvaged material a legal problem
- Amendments to the collection contract may be required
- Bags require holder or conventional containers for support

Alternative VI - Twice Weekly Collection Service

Advantages

- May reduce litter problems
- A logical demonstration program because of the large quantities of trash at each collection stop
- Would enable combined refuse collection
- Increased level of service

Disadvantages

- Amendments to collection contract would be required
- Additional collections may detract from neighborhood appearance
- Schedule changes may be a problem
- Increased opportunity for trash cans to be spilled at curb
- Increases work of householder in carrying containers
- Difficult to coordinate schedules for demonstration collections with contractor's present operations

Alternative VII - Using Disposable Bags with On-Property Collection Service

Advantages

- Would reduce litter problem
- Bags have history of high public acceptance
- Increased level of service
- Little or no capital investment by householder
- Eliminates problem of missed stops and forgotten placement of containers at curb on collection day
- Employment opportunities for bag distribution work
- Reduce noise of collection operation
- Would enable combined refuse collection once per week
- Reduces container theft problems
- Improves neighborhood esthetics

Disadvantages

- Increases cost for collection service
- Amendments to the collection contract would be required
- Bag distribution to residents required
- Container storage location identification difficult
- Requires larger crew sizes
- Trash may accumulate in the container storage area
- Requires the collector to go on private property
- Difficult to integrate with current contractor collection method
- Care in use of bags needed (education problem)
- Difficult to provide with unlimited refuse pickup
- Animal attack on bags

Alternative VIII - Twice Weekly Collection Service with Conventional Container Equipment

Advantages

- Would reduce litter problems
- Would enable combined refuse collection
- Increased level of service
- A logical demonstration because of the large quantities of trash generated in the study area
- Improves visual esthetics of neighborhood

Disadvantages

- Difficult to enforce proper container use
- Theft of new containers a problem
- Could be opposed by local commercial business if containers provided by others
- Indigent persons may refuse to purchase containers

- Capital investment required for initial container replacement
- Will not provide continuing employment for area residents
- Amendments to the collection contract would be required
- Difficult to coordinate collection schedules for demonstration with contractor's present schedule
- Increased opportunity for trash cans to be spilled at the curb or alley location
- Schedule changes could be a problem
- Additional collections may detract from neighborhood appearance
- Increases work of householder in carrying containers

Alternative IX - Semi-Automated Container Lift System

Advantages

- Would reduce litter problem
- Would reduce problems of animal attack on containers
- Reduces number of containers for collection
- Improve community appearance on collection day
- Reduces work load on resident
- Would enable combined refuse collection once per week
- Reduce odors and health hazards of flies
- Status symbol
- Reduces work load on collector
- Improves collection safety and reduces noise

Disadvantages

- Requires addition of hardware to collection vehicle
- High initial cost
- Could be opposed by local commercial businesses who might suffer declining container sales
- Indigent persons may refuse to purchase container
- Relatively unknown method
- Amendments to the collection contract would be required
- Theft of containers a potential problem
- Container size larger than presently allowed by contract
- Will not provide continuing employment for area residents

Alternative X - Semi-Automated Container Lift System and Separate Collections of Residential Waste for Salvage

Advantages

- Employment opportunities created for area residents
- Income could be used to reduce tax rate in the FGDD
- Could integrate well with the pending city of Los Angeles Reclamation Center concept

- Community organizations could be involved in project
- Fits well with current interest in ecology
- Study area close to markets for salvage materials
- Would reduce litter problem
- Would reduce problems of animal attack on containers
- Reduce number of containers for collection
- Improve community appearance on collection day
- Would enable combined refuse collection once per week
- Reduce odors and health hazards of flies
- Status symbol
- Reduces work load on collector
- Improves collection safety and reduces noise

Disadvantages

- Requires addition of hardware to collection vehicle
- High initial cost
- Could be opposed by local commercial businesses who might suffer declining containers sales
- Indigent persons may refuse to purchase container
- Relatively unknown method
- Theft of containers a potential problem
- Container size larger than presently allowed by contract
- Uncertain market for salvaged items
- Requires householder cooperation in segregating trash
- More complex and thus the chances of failure are greater
- May require separate collections on more than one day
- Unauthorized persons may pick up salvage materials
- Ownership of salvaged material a legal problem
- Amendments to the collection contract would be required

CHAPTER VIII

SYSTEMS ANALYSIS

This chapter will describe the procedure used for ranking the alternative solid waste management systems and the results of preliminary economic analyses completed for the more promising alternatives.

A. Methodology

The time constraints of the project did not permit a detailed technical analysis to be made for each of the 10 alternative systems considered for the study area. Sufficient preliminary analysis was completed, however, to identify important parameters affecting the feasibility of each system when superimposed on study area conditions.

The cost analysis generally consisted of the following:

- An estimate of purchase and installation costs as applicable for each alternative
- Market value for salvage items
- Effects on refuse collection operations and costs

Appendix C describes the methods used to develop the above cost analysis.

Engineering judgment was then used to subjectively assess the degree to which each alternative waste management system would satisfy the desired system criteria. Chapter VI described these criteria and the ranking of criteria importance by knowledgeable individuals. Those individuals ranking the alternative solid waste management systems used an evaluation matrix, in conjunction with a brief description of each of the alternative systems, the advantages and disadvantages identified in Chapter VII, and the cost data from Appendix C. Each man was provided a description of study area conditions and visited the area. The individuals were requested to review the desired criteria and assess the degree to which each waste management system alternative would satisfy each criterion. A scale of 1 to 10 was used with 1 signifying little or no satisfaction of the criterion being considered, and 10 signifying complete or nearly complete satisfaction. Table VIII-1 illustrates the ranking matrix with the desired system criteria listed vertically along the left side and the various system alternatives identified at the top.

TABLE VIII-1

RANKING MATRIX

<u>Desired Criteria</u>	Demonstration System Alternative ¹									
	I	II	III	IV	V	VI	VII	VIII	IX	X
Reduce street litter	2									
Minimize costs										
Provide employment										
Improve esthetics										
Convenient for use										
Enable combined collection										
Acceptable to contractor										
Demonstrable										
Resist animal attack										
Owners and renter acceptance										
Reduce related problems										
Flexible										
Reliable and proven										
Implementable										
Self-sustaining										
Improve community pride										
Reduce health hazards										
Known to residents										

NOTE: (1) I Household compactors
 II Sink garbage grinders and conventional containers
 III Disposable trash bags
 IV Use of conventional containers
 V Separate collection for salvage and disposable trash bags
 VI Twice weekly collection of combined refuse
 VII On-property collection of combined refuse using disposable bags
 VIII Twice weekly collection with conventional container replacement
 IX Semi-automated container lift
 X Semi-automated container lift and separate collection for salvage

(2) Degree to which system alternative satisfies the criteria (1 little or none, 10 almost completely)

The completed ranking matrix tabulation of each individual were next combined with his criteria ranking as presented in Chapter VI. The relative value assigned each criterion was multiplied by the degree of satisfaction ranking given that criterion in each alternative system. The resulting column of numbers was then summed for each alternative system. An example of the process for Alternative I is illustrated below. Table VIII-2 lists the desired criteria, the relative importance of each as decided by this individual (column headed W), and an evaluation of the extent to which this individual believes system Alternative I satisfied each criterion (column headed I).

TABLE VIII-2
ILLUSTRATION OF EVALUATION PROCESS

Desired Criteria	W ¹	Demonstration System Alternative				
		I	V	IX
Reduce street litter	10	8 ²				
Minimize costs	8	1				
Provide employment	9	2				
Improve esthetics	4	8				
Convenient for use	8	10				
Enable combined collection	6	10				
Acceptable to contractor	8	7				
Demonstrable	10	1				
Resist animal attack	2	8				
Owner and renter acceptance	8	1				
Reduce related problems	5	8				
Flexible	6	1				
Reliable and proven	6	1				
Implementable	10	1				
Self-sustaining	5	3				
Improve community pride	4	6				
Reduce health hazards	9	10				
Known to residents	1	3				

Note:

- (1) Relative importance of criteria (1 least important, 10 most important). (See Chapter VI for details.)
- (2) Degree to which system alternative satisfies the criteria (1 little or none, 10 almost completely).

Column W values are multiplied by Column I values from Table VIII-2 and the resultant value recorded in Column I of Table VIII-3. Column I values in Table VIII-3 are summed resulting in the value 562. These steps were repeated for each system alternative by each person completing the evaluation.

TABLE VIII-3

ILLUSTRATION OF EVALUATION PROCESS

Desired Criteria	W	Demonstration System Alternative				
		I	V	IX
Reduce street litter	10	80				
Minimize costs	8	8				
Provide employment	9	18				
Improve esthetics	4	32				
Convenient for use	8	80				
Enable combined collection	6	60				
Acceptable to contractor	8	56				
Demonstrable	10	10				
Resist animal attack	2	16				
Owner and renter acceptance	8	8				
Reduce related problems	5	40				
Flexible	6	6				
Reliable and proven	6	6				
Implementable	10	10				
Self-sustaining	5	15				
Improve community pride	4	24				
Reduce health hazards	9	90				
Known to residents	1	3				
Column Total	119	562				
Normalized	100	472				

In order to properly combine the system evaluations of the evaluators, a normalization process is required. This is accomplished by dividing the column totals of each system alternative (562 in Table VIII-3) by the ratio of the Column W total to 100. Thus in Table VIII-3, 562 is divided by the ratio 119/100 to give 472. The 472 is a subjective number which can be compared with similarly derived corresponding numbers of other evaluators.

B. Ranking

Table VIII-4 provides the normalized column totals derived from the evaluation process for each of the evaluators. The column labeled "Final Rank Score" is the average of the four evaluator scores for each alternative. The overall rank of each system is shown in the far right column.

TABLE VIII-4
EVALUATION RESULTS

Demonstration System Alternative	Evaluator				Final Rank Score	Overall Rank
	1	2	3	4		
I	472	487	564	661	546	10
II	547	538	532	770	597	7
III	650	553	685	780	648	1
IV	625	533	612	763	633	5
V	632	646	615	654	637	4
VI	574	470	550	711	576	8
VII	621	603	604	684	628	6
VIII	555	488	541	701	571	9
IX	619	681	607	667	644	3
X	638	635	614	692	645	2

Note that the five highest ranked systems received final scores ranging from 648 to 633, a spread which is not significant statistically. Each of these 5 alternatives represents viable waste management systems for the study area.

C. Review

The preliminary analysis left five alternative systems still potentially feasible for the demonstration. Other considerations were necessary, therefore, in selecting a single system for demonstration. If a longer demonstration period were available and additional funds could be obtained, comparative demonstrations of several alternatives could be programmed.

Further discussions with the project staff and representatives of the Model Neighborhood Program determined that an additional criterion of importance to success of the demonstration program would be "visibility of the system," i.e., those areas participating in the demonstration would be readily identifiable by all community residents. Additionally, a "unique character" in the system was desired. These two criteria specifically relate to desired system aspects that would help insure area resident interest in participating in the demonstration program and learning of the results achieved.

As noted in Chapter V, a significant percentage of area residents had previously purchased disposable refuse bags (System Alternative III), and approximately 50 percent of the purchasers continued to use bags. However, the primary user of bags (the owners) were also those most concerned with litter. A demonstration system incorporating disposable bags, therefore, would have little "unique character" or a great deal of "visibility." Conversely, the two alternatives involving the use of the semiautomatic lift container are high "visibility" and unfamiliar to area residents (and to Los Angeles County generally). Thus, the solid waste management system incorporating the use of the semiautomatic lift container was considered the best system for demonstration. Separate collections for salvage would be investigated during the demonstration to establish economic practicality.

CHAPTER IX

DEMONSTRATION PROGRAM PLAN

A. System Description

The following elements are recommended for inclusion in the demonstration program.

- Use of improved residential waste storage containers to minimize refuse spillage and resulting litter on streets, alleys, and vacant lots while achieving improved efficiency in refuse collection service.
- Provision of supplemental street cleaning for inaccessible areas.
- Coordination of present street cleaning activities of the Los Angeles County Road Department with residential refuse collection operations of the private contractor.
- Use of additional properly placed sidewalk litter containers for receipt of pedestrian refuse.
- Education of area residents to the benefits of sanitation through participation in the demonstration program.
- Participation of residents in a trial voluntary refuse recycling program to provide possible increased employment and income, while conserving resources.

The semi-automated container lift system for residential wastes will be demonstrated and compared with the present system and with the use of new conventional containers. Photographs IX-1 to IX-5 illustrate the 82 gallon capacity container for residential use and the device for unloading the container into the collection truck.

The semi-automated container lift system is distributed by two local firms: DeWald Fabrications of Sun Valley, California, representing Molded Products Company, and Alex Moag of Salinas, California, representing Fusion Rubbermaid. To use the system with the contractors present collection equipment will require the fabrication of a lift device for mounting upon the collection truck. At present, commercial lifting devices are available for certain collection truck models, but not for the Shu-Pak truck used by the contractor.

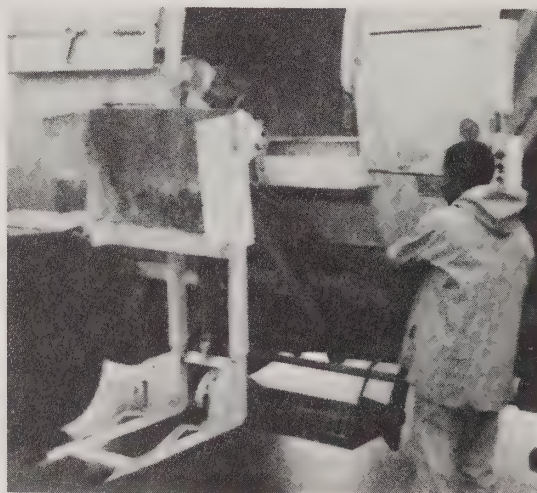
The cost to fabricate and mount a lift unit on a truck has been estimated at from \$1500 - 2000 by DeWald Fabrications and the collection contractor. Off-the-shelf units for certain other collection trucks are priced from \$800 - 1000 each. For



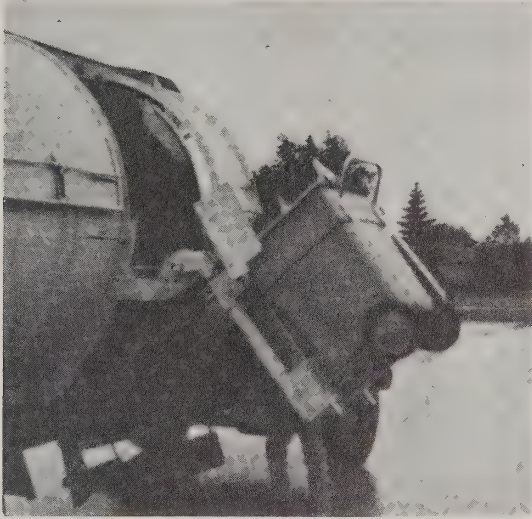
Photograph IX-1
Semi-Automated Lift
Container



Photograph IX-2
Typical Container Set-Outs



Photograph IX-3
Lift Mechanism



Photograph IX-4
Loading Operation



Photograph IX-5
Loading Operation

the demonstration period a single unit would be fabricated for use. Backup in case of equipment breakdown would be provided by a demonstration unit available from the distributor and mounted on a demonstrator truck.

The three month demonstration of conventional containers would immediately follow the three month demonstration of the semi-automated container collection system. Conventional containers of plastic or galvanized metal construction and 40 gallon capacity can be purchased for \$3.50 each. The containers will be left with residents participating in the demonstration program to replace the 82 gallon containers provided residents during their participation in the semi-automated container demonstration.

Street sweeping schedules will be modified during the demonstration so that sweepers cover areas as soon as practical after refuse collection activities have been completed. The street sweeper can only cover one side of each street on a day, however, because the other side must be available for parking. As part of the demonstration, therefore, it is envisioned that supplemental street cleaning will be performed by one-man scooter-type litter collection vehicles. These vehicles will either be provided by the County Road Department or rented for the demonstration. The scooters will be used to:

- Broom clean areas inaccessible to the street sweeper, such as those resulting from parked vehicles, cul-de-sacs, or poor street gutter conditions

- Canvass areas that can not be scheduled for street sweeping soon after collection, so as to clean up spills before they can be scattered

Using the scooter to supplement normal street sweeping activities provides the following advantages:

- Sidewalks, parkways, and other inaccessible areas can be cleaned by this method
- Areas under parked cars and streets with poor surfacing or without curbs can be cleaned
- Model Neighborhood personnel may be employed for this work and gain pride in the neighborhood by helping to keep it clean

Additional sidewalk litter containers will be located in the demonstration areas. Criteria for locating containers throughout the study area will be formulated. It is proposed that wire basket litter containers costing approximately \$25 each be placed at locations dictated by pedestrian traffic and types of adjacent land use, such as:

- Frequently used bus stops, especially those with benches
- Entrances to schools and other institutional buildings
- At 200-300 ft intervals in commercial areas
- Adjacent to vacant lots used by children as playgrounds
- Street corners and crosswalks with heavy pedestrian traffic
- Food stands, liquor stores, corner markets, and other food vending establishments

B. Demonstration Area Selection

Two demonstration areas within the Model Neighborhood were selected based on land use considerations, and discussions with the solid waste collection contractor. They are representative of both the Florence-Firestone and Willowbrook communities.

Sixteen subareas within the Neighborhood (eight in each community) were carefully analyzed for land use and dwelling unit information. This data was summarized from information supplied from the RPC and is presented in Table IX-1 and IX-2 for the Willowbrook and Florence-Firestone communities, respectively. The far right hand column contains the information for each of the two communities taken as a whole.

TABLE IX-1
LAND USE SUMMARY
WILLOWBROOK COMMUNITY

		Land Use	1	2	3	Subarea		6	7	8	Total Community
L A N D U S E	1	Single Family	48	51	54	19	30	45	49	<1	39.4
		Two Family	9	13	7	0	11	2	4	0	5.4
		Mult. Family	1	3	1	0	4	1	1	0	1.2
		Commercial	1	2	1	1	3	4	1	<1	1.9
		Industrial	1	0	2	1	10	4	3	24	5.0
		Vacant & Agr.	11	5	4	64	9	10	3	59	18.0
		Streets	20	16	28	12	29	24	27	13	20.8
S T R E E T S A L L E Y S	L O T S	40 ft Streets	5	15	53	21	83	0	11	21	19.0
		60 ft "	21	45	15	0	6	35	40	22	27.9
		80 ft "	8	4	2	0	0	11	11	13	7.3
	A L L E Y S	25 ft Lots	21	<1	91	0	92	5	7	<1	38.2
		40 ft "	13	3	<1	8	<1	14	15	0	7.3
		50 ft "	52	24	3	57	1	57	31	6	28.7
		Alleys ³ (Length) Percent of Streets	1	0	27	0	65	27	36	46	22.3
D W E L L I N G	U N I T S	D.U./mile ⁴	148	176	180	123	118	127	121	(No Residential Structures in This Area)	135.8
		Standard	73	60	61	96	34	92	78		71.9
		Major Repair	19	27	31	3	44	7	18		20.6
		Dilapidated	8	11	8	<1	22	<1	3		7.0
		Substandard	27	38	39	4	66	8	21		27.5

¹Tabulated values are percent of land area

²Tabulated values are percent of total

³Length of alleys as a percent of street length in subarea

⁴Average number of dwelling unit per mile of street

TABLE IX-2

LAND USE SUMMARY

FLORENCE-FIRESTONE COMMUNITY

		Land Use	9	10	11	Subarea		14	15	16	Total Community	
						12	13					
LAND USE	U ¹	Single Family	25	15	5	16	17	18	19	22	17.5	
		Two Family	24	25	5	17	16	18	21	24	19.0	
		Mult. Family	5	12	2	6	15	13	7	8	9.0	
		Commercial	2	5	1	2	5	3	6	2	3.3	
		Industrial	1	3	48	15	11	9	8	9	11.5	
		Vacant & Agr.	3	2	2	5	3	2	2	4	2.8	
		Streets	26	27	22	23	23	29	21	27	25.0	
LOTS & ALLEYS		40 ft Streets	7	3	12	12	5	12	15	13	8.3	
		60 ft "	29	36	44	4	35	26	18	21	32.0	
		80 ft "	12	8	16	0	12	15	4	3	8.6	
	A ²	25 ft Lots	17	12	61	87	14	23	12	72	35.8	
		40 ft "	52	56	3	2	45	8	14	13	27.7	
		50 ft "	24	16	25	41	13	48	45	1	19.7	
		Alleys ³ (Length) Percent of Streets	55	46	24	50	16	36	10	37	33.6	
	DWELLING	U ²	D.U./mile ⁴	223	246	69	182	319	216	123	183	201.4
			Standard	68	75	51	52	61	60	62	64	63.7
			Major Repair	24	20	35	36	29	31	29	24	27.5
		Dilapidated	8	5	15	12	10	10	9	9	8.8	
		Substandard	32	25	49	48	39	40	38	36	36.3	

¹Tabulated values are percent of land area

²Tabulated values are percent of total

³Length of alleys as a percent of street length in subarea

⁴Average number of dwelling unit per mile of street

The single subarea within each community having land use most representative of the entire community was selected. This was subarea #1 in the Willowbrook community and #13 in the Florence-Firestone community. The locations of the subareas are delineated on Figure IX-1.

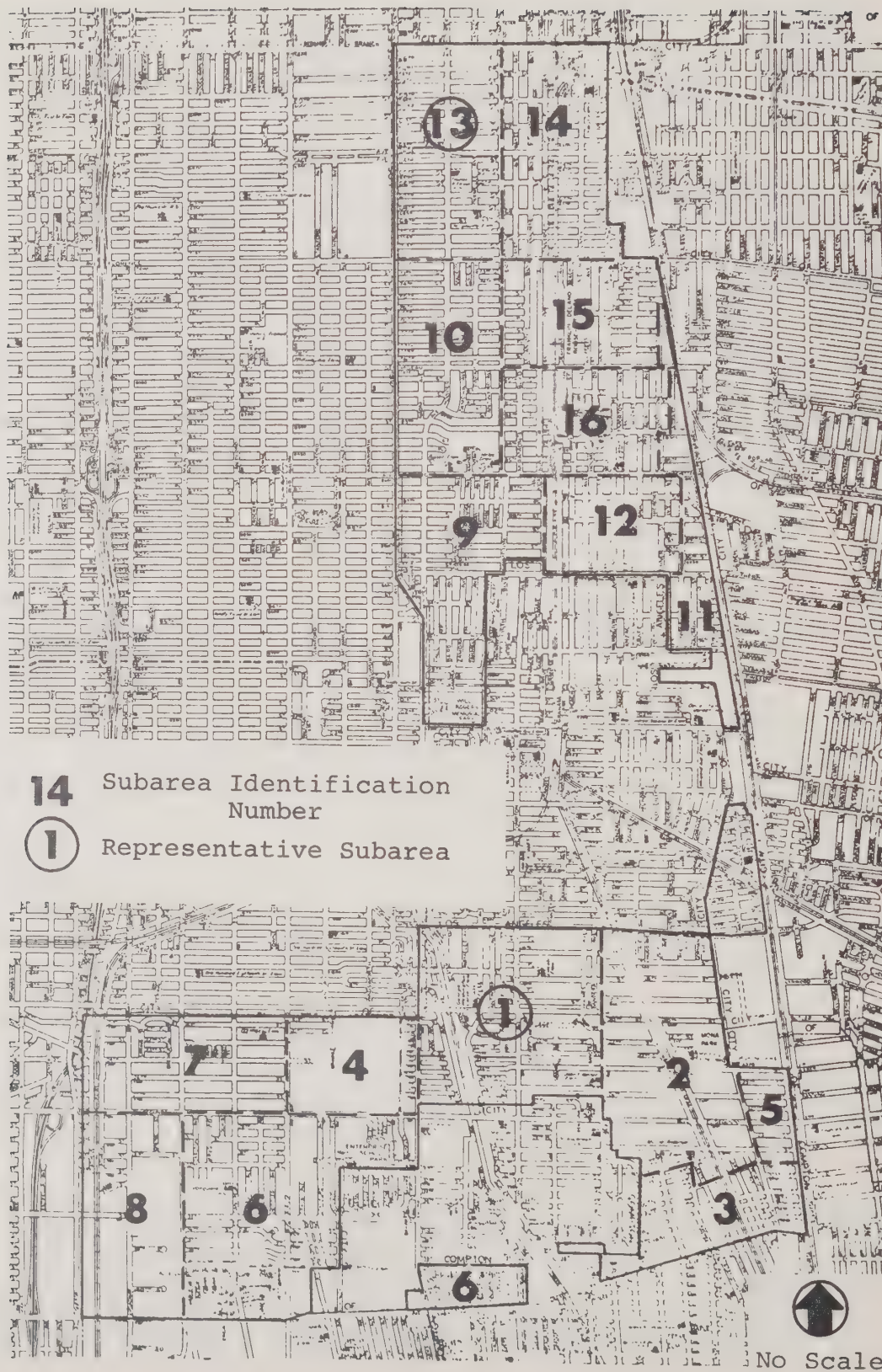
Discussions were held with the collection contractor to identify existing refuse collection routes within the two representative subareas. Several routes were selected in each for further subarea evaluation. For each route, the number of dwelling units by type, number of collection stops, and land use percentages were tabulated. The route in each subarea most representative of the community was again selected. The properties served by these routes are to be the two demonstration areas. The demonstration areas are shown on Figures IX-2 and IX-3. Land use is delineated on these figures. Additional information on each demonstration area is tabulated in Table IX-3.

TABLE IX-3
DEMONSTRATION AREAS

Community	Collection Day ¹	Dwellings (no.)			Collection stops (no.)	
		Single	Duplex	Other	Residential	Commercial
Florence-Firestone	Monday	327	30	11	276	25
Willowbrook	Thursday	327	69	3	286	9
Total		654	99	14	562	34

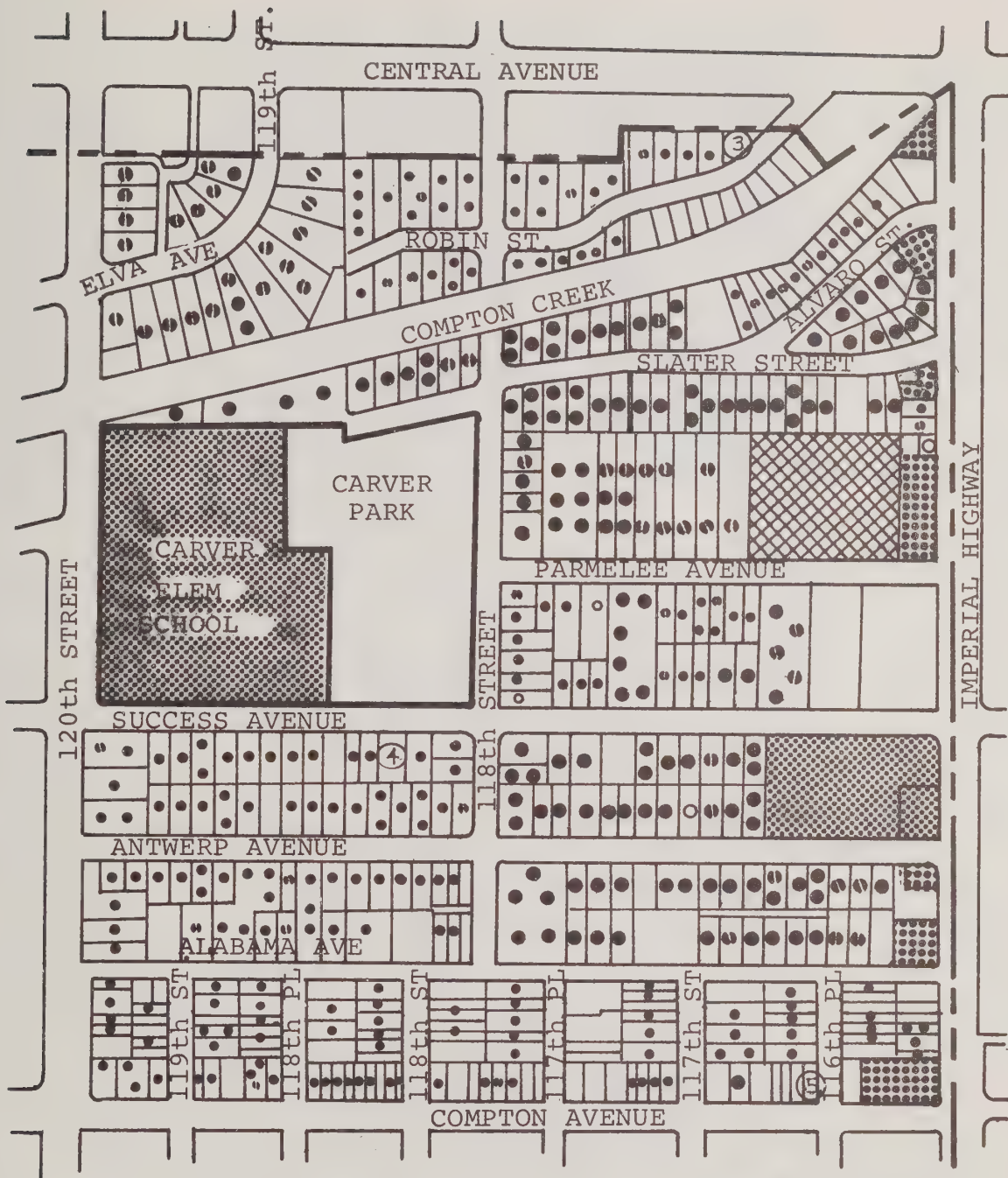
¹Now provided by collection contractor.

To facilitate comparisons of the effectiveness of the demonstration system, two control areas will be established and monitored during the demonstration period. The control areas will also comprise an established refuse collection route and lie within the same community subarea as the demonstration area for that community.



SCS ENGINEERS

FIGURE IX-1
COMMUNITY SUBAREAS



LEGEND

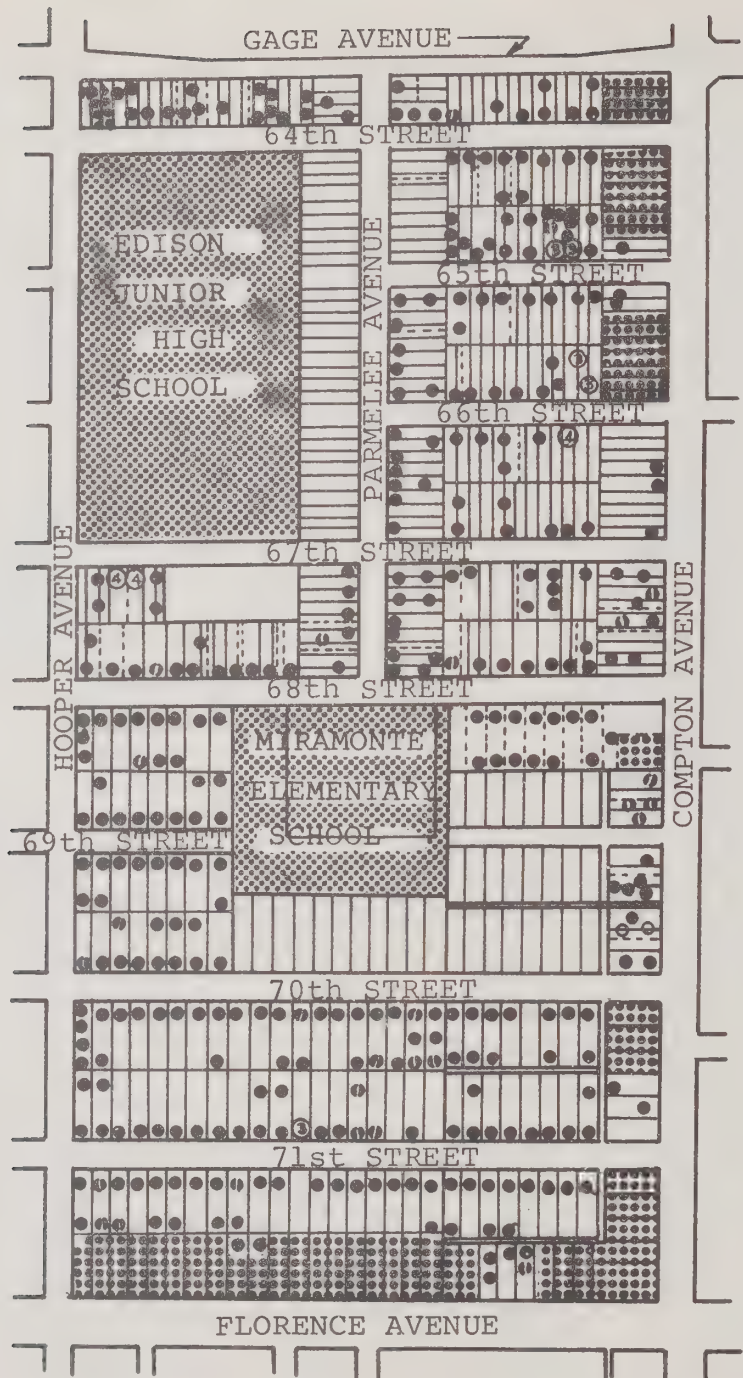
- Single Family
- ⊙ Two Family
- ③ Multiple Family
- Vacated
- Commercial
- Industrial
- Institutional



Scale: 1" = 400'

FIGURE IX-2
WILLOWBROOK COMMUNITY
SOLID WASTE MANAGEMENT
DEMONSTRATION AREA

SCS ENGINEERS



LEGEND

- Single Family ○ Vacated
- Two Family Commercial
- ⊙ Multiple Family Institutional



Scale: 1" = 400'

SCS ENGINEERS

FIGURE IX-3
FLORENCE-FIRESTONE COMMUNITY
SOLID WASTE MANAGEMENT
DEMONSTRATION AREA

C. Project Evaluation

During the demonstration, field evaluations are required to define the effectiveness of the system in improving collection efficiency and service and in reducing litter problems in the demonstration area.

Evaluation methods will include: time studies of refuse collection crews; recording performance of containers and other hardware; measurements of street, alley, and vacant lot litter; measurement of quantities of refuse collected; and opinions of residents and the collection contractor regarding the system. Monitoring of street, alley, and vacant lot cleaning programs will continue during the demonstration period.

Improvements obtained in waste management during the demonstration will be measured in terms of:

- Effects upon solid waste management costs
- Litter reductions achieved
- Opinions of residents participating in the demonstration

Cost effects will be assessed using engineering evaluation techniques similar to those presented in Appendix C.

Litter reduction can be assessed by using a litter index. Two methods for establishing a litter index are proposed.

The first involves manual collection and measuring of litter from a specified test area. This method is suitable for a qualitative assessment of litter reduction achieved by the demonstration system. Litter in specified areas within both the demonstration and control areas would be periodically collected using manual means before the demonstration system was implemented. Similar counts would be made after the demonstration system had been installed.

Care will be taken to perform the litter counts in exactly the same areas and with due regard to the scheduled days of street sweeping and refuse collection. Climate variations will also be taken into account. All litter from within the specified area over a specified minimum size (such as 1 in. square) would be collected by workers. The litter index could be the total surface area of the collected litter divided by the size of the specified area. Reductions in litter would result in a reduced litter index. This first method of establishing a litter index requires considerable manual labor and probably is impractical for routine use in evaluating solid waste management practices other than under demonstration conditions.

A second method, utilizing much less labor and suitable for use both during and after the demonstration involves the use of video tape recordings of litter materials in streets, alleys, and on vacant lots. The city of San Diego presently uses the method to identify roadway litter problems, and as a basis for scheduling street sweeping frequency. A pickup truck is used to transport the video camera recorder at about 10 miles per hour through the area to be evaluated. The road and parkway conditions are recorded on video tape for careful study at an office monitoring unit. By recording conditions at various time periods after street sweeping activities, litter accumulation can be determined and compared with conditions in other areas. Those areas showing a more rapid buildup of litter are scheduled for more frequent sweeping. A litter index can be developed from this method by counting visual litter objects in the field of view over a given travel distance.

This method can be adapted for use during the demonstration. Monitoring of street and parkway litter conditions in the demonstration and control areas can be completed before and after demonstration system implementation. Resultant changes in litter conditions can be recorded and evaluated.

A number of area residents have already been employed and trained in the administration of questionnaires. In order to obtain resident opinions on use of the demonstration system, questionnaires will be administered at the end of three months and again at the end of the sixth month. The questionnaire will be a personal interview type, similar to that discussed in Chapter V of this report. Content will be oriented toward determining the improvements in perceived litter conditions, convenience, and service associated with the demonstration system, when compared with the present system. The questionnaires administered at the close of the sixth month will request comparisons between the use of the semi-automated lift container and conventional containers, as well as with the present system.

The opinions of the collection contractor on the demonstration system will be sought throughout the demonstration. Since the semi-automated lift container is expected to reduce hazards and injuries to collection personnel, and improve collection efficiency, the experience of the contractor with the system will be valuable in determining final system effectiveness.

Records will be kept of container performance. Since a key element in the cost of the demonstration system lies in the useful life of the container, the rate of container failure will be evaluated. A longer demonstration period would be particularly valuable in assessing this factor. Failure type and probable cause will be identified and recorded.

D. Information Dissemination to Residents

Residents of the demonstration areas will be contacted and their role in the test program fully explained. During and immediately following the actual field demonstrations, close contact will be maintained with participating residents to determine their opinions of the new waste system.

An area information dissemination program has been derived to serve four functions: (1) to inform demonstration area households of their selection as participants in the project; (2) to inform demonstration area households of the purposes and goals of the project; (3) to enlist the cooperation and support of demonstration area households in conducting the project; and (4) to inform residents not in the demonstration areas of project activity, progress, and results achieved.

A ten minute sound motion picture film of the semi-automated lift container system is proposed. Several prominent residents from each of the demonstration areas would be utilized as "actors" in the film. The film will be narrated to explain the purpose of the demonstration project, how to use the containers, project scheduling, and how to obtain additional information about the demonstration project and/or the containers.

The film would be shown to both community councils prior to the commencement of the project. It would also be made available for interested citizen groups within the two communities. Showings of the film to as many groups as possible will serve the purpose of informing people of the project and generating interest.

A general information leaflet will be distributed throughout the remainder of the Florence-Firestone and Willowbrook communities. The leaflet will contain information similar to that presented in the film. It will describe the purpose of the demonstration project, explain why the system is only being employed in certain areas, and advise means to obtain additional information about the system. At least one person should be employed in the Neighborhood area for the duration of the demonstration project to answer questions concerning the nature and purpose of the project.

Upon commencement of the demonstration project, and at periodic intervals thereafter, information regarding project status will be provided to the local media, the community councils, and other interested groups, organizations, and individuals.

Since a large number of residents have expressed interest in the demonstration project, periodic information meetings should be held in the communities and a portion of the meeting be set aside for residents to ask questions about the program, register complaints, and seek additional information and guidance.

E. Voluntary Salvage Program

A high percentage of area residents indicated willingness to participate in a voluntary refuse segregation program. Such a program appears to be worthwhile for trial in the study area for several other reasons as well. These include:

- Reduces total volume of solid wastes
- Provides employment for area residents
- Provides added source of revenue
- Creates an awareness of the solid waste management problem
- Conserves natural resources

The city of Los Angeles is considering a voluntary recycling program involving segregation of cans and bottles by householders. Householders would take these materials to recycling centers located at supermarket locations. A similar concept is suggested for trial in the study area or an alternative method providing for collection of segregated materials from homes on a monthly basis.

Preliminary cost analyses summarized in Appendix C indicates the salvage value of study area solid waste to be \$2.73 per ton. Assuming 75 percent of the metal and glass contained in study area solid wastes were recovered in a recycling program, gross salvage income would average about \$6500 monthly. Calculations indicate that a collection system involving area residents and collection contractor equipment on Saturdays could collect these materials and return a net income of about \$3000 per month, while providing Saturday employment for a small number of area residents.

Due to the short (3 month) demonstration period for the semi-automated lift container before replacement with conventional containers, implementation and evaluation of a trial recycling program would be difficult. It is suggested, therefore, that further evaluation of the concept continue during the demonstration with a small trial program carried out and a test program formulated for possible implementation as a follow-on project to the demonstration. Residents will be further queried as to the extent of recycling interest.

F. Employment Opportunities for Area Residents

There are a number of tasks in the proposed project which require extensive field data gathering and related work in the Model Neighborhood and demonstration areas. The personnel

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F. Employment Opportunities for Area Residents

There are a number of tasks in the proposed project which require extensive field data gathering and related work in the Model Neighborhood and demonstration areas. The personnel

obtaining this data do not require an extensive background in solid waste engineering. A preliminary training period combined with competent supervision and proper data gathering forms should suffice to provide area residents sufficient background to perform competently in gathering information. An area subcontractor will be sought to hire, train, and supervise area residents for the data gathering and field observation work.

The following is a general description of the work wherein the opportunity for area resident employment exists:

- Container assemblage, distribution, and pickup work
- Assist in information dissemination to residents concerning their role in the demonstration and results of the demonstration work
- Employment as operators of utility scooters for supplemental street cleaning work
- Employment for assisting in collection of segregated salvage materials
- Field interviews with Model Neighborhood and demonstration area residents to sample opinions and comments concerning solid waste disposal and changes implemented during the demonstration period
- After the demonstration tests are underway, perform various observations concerned with changes in litter and refuse quantities and the general environment in the demonstration area
- Observe and estimate the quantity of spilled and littered refuse at the container storage location and at the curb or alley collection point location on the day of contractor service
- Segregate refuse to assist in determining refuse composition in the Model Neighborhood area, and effects of voluntary salvage program
- Surveying the sanitary condition of streets and alleys, vacant lots, curb side parking, etc.
- Determining the number, type, condition, and storage location of refuse storage containers in use by multiple family and single family dwellings
- Number and type of refuse containers and miscellaneous items placed at the curb or alley for collection by the private contractor

Metal or plastic cans
Bundled refuse
Disposable cardboard boxes or bags
Bulky items
Demonstration containers

- Other tasks which may arise during the project requiring field data gathering and contact with area residents.

Extent of Work

An estimate of the work effort required and the opportunity for area resident employment has been prepared. A total of 28 man-months of employment for area residents is indicated.

The consultant will require a technician and a part-time secretarial position for the demonstration period. It is estimated that the subcontract will create the opportunity for up to 18 man-months of technician and clerical employment. The actual number of residents in employ at any time would vary.

G. Project Funds

Cost estimates for conducting the demonstration program have been prepared. Categories for personnel, consultant services, equipment, and so forth have been delineated. Table IX-4 presents the estimate.

A total project period of ten months is recommended to allow project initiation, a six-month demonstration and evaluation period, and report preparation.

TABLE IX-4
DEMONSTRATION PROJECT
COST ESTIMATE

<u>Category</u>	<u>Estimated Cost</u>	
<u>Personnel</u>		
Los Angeles County Engineer		<u>\$ 16,000</u>
<u>Consultants and Contract Services¹</u>		
Engineering Consultant		
Subcontractor	\$20,000	
Project Evaluation	31,900	
Collection Contractor		
Lift Mechanism	2,000	
Collections	8,500	<u>62,400</u>
<u>Travel (local)</u>		<u>500</u>
<u>Consumable Supplies</u>		
Reproduction, film and video tape		<u>1,000</u>
<u>Rental, Lease, Or Purchase of Equipment</u>		
Lift Containers	12,000	
Conventional Containers	9,000	
Litter Containers	1,250	
Scooter Rental	1,500	
Video Camera	1,000	<u>24,750</u>
<u>Other Expenses</u>		
Publicity Mailings	1,000	
Report Printing	1,000	
Computer	4,750	<u>6,750</u>
TOTAL PROJECT		<u>\$111,400</u>

¹Includes area resident employment

CHAPTER X

IMPLEMENTATION

Detailed long range implementation plans will be prepared following the completion of a successful demonstration; however, general concepts for implementation and preliminary costs are presented in this chapter.

The solid waste management system is composed of three elements; residential waste storage, supplementary street cleaning, and additional litter containers. The latter two elements can be administered by the County Road Department. The former is complicated by the existing 4 1/2 year contract between the private collection contractor and the FGDD. The community salvage program can be included or excluded from the system.

Demonstration and implementation of the semi-automated container lift system in the study area requires cooperation of the contractor. Obviously he is not willing to suffer economic loss by implementation. In subsequent contracts let for collection of solid wastes from this district and other districts within the County, the use of the demonstration system or a similar concept could be required. Containers could be supplied by the contractor as a part of his contract bid price or by householders.

Long-term lease-purchase arrangements (5 years or more) are available to reduce capital requirements for container purchase. Supplying of containers for implementation in the study area would be the responsibility of the FGDD or the Federal Government through its Model Cities or other programs. The results of the demonstration and implementation work are of national interest, and support for the program should be forthcoming from Federal sources. Matching funds will usually be required. A phased implementation wherein portions of the study area are provided with the system can also be considered. The community salvage program can greatly enhance the possibilities for Federal funding. The success of the recycling program is sensitive to local market demand for tin cans and glass containers. At present, a ready market exists for these two components of solid waste.

Collection and disposal of refuse in the study area now costs \$420,000 annually. This does not include costs incurred by the County Road Department, the Forestry and Fire Warden Department, and the County Health Department for services related to solid waste. Conservatively, total annual costs for solid waste management in the area, including these county agencies approaches \$675,000.

Full implementation of the proposed demonstration solid waste management system in the Model Neighborhood would increase present costs approximately 25 percent to \$844,000. This preliminary estimate was derived as follows:

Semi-Automated Container Lift System	<u>Annual Cost</u>
21,000 dwelling units 1 container @ 80¢/mo	\$202,000
Residential waste collection and disposal service	420,000
Street Cleaning	
Present program	75,000
Supplementary program	25,000
Sidewalk Litter Barrels	
Present program	5,000
Supplementary program	5,000
Vacant Lot Cleaning	138,000
Salvage of Waste Components (Net Income)	<u>(36,000)</u>
Subtotal	<u>\$844,000</u>
Present Costs	<u>\$675,000</u>
Difference	<u>\$169,000</u>
Percent of Present Costs	<u>25%</u>

The above tabulation does not include estimated reductions in present waste collection and disposal costs resulting from the improved container system. Terms of the present contract with the private hauler cannot be changed to reflect this possible savings unless agreed to by both the County and the hauler. The potential reduction in cost to the collector is estimated to be \$120,000 annually.

In addition, the impact of the demonstration system on future costs for street and vacant lot cleaning cannot be estimated at this point; therefore, present estimated costs for these services are used.

APPENDIX A

SCS Engineers
4014 Long Beach Boulevard
Long Beach, California 90807
Form 2170-4

Geog. Unit _____
Block No. _____

MODEL NEIGHBORHOOD WASTE STORAGE SURVEY

INTRODUCTION

SCS Engineers of Long Beach, California, has been named by Los Angeles County to design and demonstrate an improved method for garbage and rubbish collection in the Florence-Firestone and Willowbrook communities. The objective of the new collection method will be to enhance the community environment and sanitation by improving collection service for residential wastes, control of litter, and proper waste storage. The cooperation and support of selected area residents for demonstration tests will be sought by the firm.

We are conducting a survey to determine how much litter (carelessly strewn, spilled, or discarded rubbish) is currently in your neighborhood (the street on which you live) and in the Florence-Firestone/Willowbrook community in general. This survey will aid us in determining how we can help eliminate the litter problem and improve collection service.

Your assistance by taking a few minutes to answer some questions is appreciated.

SCS Engineers
4014 Long Beach Boulevard
Long Beach, California 90807

Geog. Unit _____
Block No. _____
House No. _____
Street Name _____

MODEL NEIGHBORHOOD

WASTE STORAGE SURVEY

In your neighborhood how much
litter do you see

None Some A lot DNA

in your yard
in your street
in your alley
in vacant lots
around commercial
buildings

In Willowbrook/Florence-Firestone how
much litter do you see

in yards
in streets
in alleys
in vacant lots
around commercial
buildings

Comparing your neighborhood with
Willowbrook/Florence-Firestone how
much litter have you seen

Less Some More DNA

in yards
in streets
in alleys
in vacant lots
around commercial
buildings

In your neighborhood where you have
seen litter tell us how much it
bothers you

None Some- Very
what much DNA

in yards
in streets
in alleys
in vacant lots
around commercial
buildings

MODEL NEIGHBORHOOD WASTE STORAGE SURVEY

In your neighborhood where you have seen litter, what do you think has caused it?

Animals _____
People _____
Poor collection _____
service _____
Other _____
DNA _____

(Note to interviewer: If respondent answers "People," then ask next question.)

If people are the major causes of these litter problems, who are they and why do you think they do it?

How often is your rubbish picked up?

Once a week _____
Twice a week _____
Three times a week _____
Other _____
Don't know _____

Is this often enough?

Yes _____
No _____ Why not? _____

How often are large bulky trash items picked up?

Once a week _____
Once a month _____
Once a year _____
Only when you call _____
Don't know _____

MODEL NEIGHBORHOOD WASTE STORAGE SURVEY

Is this often enough?

Yes _____
No _____

Why not? _____

(Note to interviewer: If answer to question is "no" then ask next question.)

Is there any way you can get bulky trash items picked up more often? If yes, how?

How often is your garbage picked up?

Once a week _____
Twice a week _____
Three times a week _____
Four or more _____
Don't know _____

Is this often enough?

Yes _____
No _____

Why not? _____

Do you have a garbage grinder in your kitchen sink?

Yes _____
No _____

Do rubbish/garbage containers placed at the curb on collection day bother you? (Note to interviewer: Reasons might include odors, unsightly, spillage, etc.)

Yes _____
No _____

Why? _____

Do you experience any problems in storing your garbage and rubbish between days of collection?

Yes _____
No _____

Why? _____

MODEL NEIGHBORHOOD WASTE STORAGE SURVEY

How long do your garbage and rubbish cans last?

less than 1/2 yr. _____
1/2 to 1 yr. _____
1 to 2 yrs. _____
more than 2 yrs. _____

How many rubbish/garbage containers do you own?

One _____
Two _____
Three _____
Four or more _____

How much do you pay each month for garbage and rubbish collection?

Free _____
Less than \$1.00 _____
\$1.00 - \$2.00 _____
\$2.00 - \$3.00 _____
\$3.00 or more _____
Don't know _____

Have you ever purchased plastic trash bags?

Yes _____
No _____

If "yes," do you regularly use them?

Yes _____
No _____

Would you be willing to keep glass or cans or newspapers separate from your other rubbish if it would help solve the litter problem in your neighborhood?

Yes _____
No _____

- (a) If "yes," would you be willing to take the glass, cans, and papers to a special collection place?

MODEL NEIGHBORHOOD WASTE STORAGE SURVEY

- (b) If "yes" to (a), how far would you be willing to go to take your glass, cans, and papers to a special collection place?

Any place in your neighborhood _____
Any place in Willowbrook/Florence-Firestone _____
Any place in Los Angeles County _____

- (c) If "no" to (a), would you be willing to separate glass, cans, and papers and take them to a special collection place if you were paid 1¢ each or given trading stamps?

Yes _____
No _____

- (d) If "yes" to (c), how far would you be willing to take your glass, cans, and papers to a special collection place?

Any place in your neighborhood _____
Any place in Willowbrook/Florence-Firestone _____
Any place in Los Angeles County _____

Do you know of any place where you can now take glass, cans, or newspapers for money or trading stamps?

Yes _____
No _____

Do you do this?

Yes _____
No _____

How long have you lived in this neighborhood?

0 - 1 year _____
1 - 5 years _____
more than 5 years _____

What age group are you in?

Under 20 _____
20 - 30 _____
31 - 40 _____
41 - 50 _____
51 - 60 _____
Over 60 _____

MODEL NEIGHBORHOOD WASTE STORAGE SURVEY

Where did you live prior to moving into the Willowbrook/
Florence-Firestone community?

Los Angeles County _____
Another location in California _____
Another state _____
Another country _____

Which state? _____
Which country? _____

Sex

Male _____
Female _____

Do you own your home or rent?

Own _____
Rent _____

How many children who live with you are between the ages of
12 and 20?

0 - 1 _____
2 - 3 _____
3 - 4 _____
4 or more _____

To be filled out by interviewer:

Which of the following best describes the living quarters of
this family?

Single family house, detached _____
Two-family house or row house _____
Apartment in apartment building _____
Apartment in partly business bldg. _____
Rooming house _____
Non-transient hotel/motel, etc. _____
Other (specify) _____

APPENDIX B

WILLOWBROOK			FLORENCE-FIRESTONE			MODEL NEIGHBORHOOD		
	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
G			G			G		
1	103	19.62	1	0	0.00	1	103	10.05
2	74	14.10	2	0	0.00	2	74	7.22
3	72	13.71	3	0	0.00	3	72	7.02
4	48	9.14	4	0	0.00	4	48	4.68
5	24	4.57	5	0	0.00	5	24	2.34
6	135	25.71	6	0	0.00	6	135	13.17
7	69	13.14	7	0	0.00	7	69	6.73
8	0	0.00	8	0	0.00	8	0	0.00
9	0	0.00	9	62	12.40	9	62	6.05
10	0	0.00	10	79	15.80	10	79	7.71
11	0	0.00	11	14	2.80	11	14	1.37
12	0	0.00	12	39	7.80	12	39	3.80
13	0	0.00	13	73	14.60	13	73	7.12
14	0	0.00	14	73	14.60	14	73	7.12
15	0	0.00	15	48	9.60	15	48	4.68
16	0	0.00	16	112	22.40	16	112	10.93
	525	99.99		500	100.00		1025	99.99

IN YOUR NEIGHBORHOOD HOW MUCH LITTER DO YOU SEE IN YOUR YARD?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	318	60.57	NONE	177	35.40	NONE	495	48.29
SOME	168	32.00	SOME	273	54.60	SOME	441	43.02
A LOT	32	6.10	A LOT	35	7.00	A LOT	67	6.54
NR	6	1.14	NR	14	2.80	NR	20	1.95
NR	1	.19	NR	1	.20	NR	2	.20
	525	100.00		500	100.00		1025	100.00

IN YOUR NEIGHBORHOOD HOW MUCH LITTER DO YOU SEE IN YOUR STREET?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	142	27.05	NONE	104	20.80	NONE	246	24.00
SOME	324	61.71	SOME	303	60.60	SOME	627	61.17
A LOT	54	10.29	A LOT	86	17.20	A LOT	140	13.66
NR	5	.95	NR	6	1.20	NR	11	1.07
NR	0	0.00	NR	1	.20	NR	1	.10
	525	100.00		500	100.00		1025	100.00

IN YOUR NEIGHBORHOOD HOW MUCH LITTER DO YOU SEE IN YOUR ALLEY?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	154	29.33	NONE	44	8.80	NONE	198	19.32
SOME	282	53.71	SOME	188	37.60	SOME	470	45.85
A LOT	52	9.90	A LOT	206	41.20	A LOT	258	25.17
NR	37	7.05	NR	62	12.40	NR	99	9.66
	525	99.99		500	100.00		1025	100.00

IN YOUR NEIGHBORHOOD HOW MUCH LITTER DO YOU SEE IN VACANT LOTS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	86	16.38	NONE	48	9.60	NONE	134	13.07
SOME	329	62.67	SOME	176	35.20	SOME	505	49.27
A LOT	83	15.81	A LOT	194	38.80	A LOT	277	27.02
NR	27	5.14	NR	82	16.40	NR	109	10.63
	525	100.00		500	100.00		1025	99.99

IN YOUR NEIGHBORHOOD HOW MUCH LITTER DO YOU SEE AROUND COMMERCIAL BUILDINGS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	234	44.57	NONE	97	19.40	NONE	331	32.29
SOME	187	35.62	SOME	265	53.00	SOME	442	44.10
A LOT	38	7.24	A LOT	50	10.00	A LOT	88	8.60
NR	66	12.57	NR	87	17.40	NR	153	14.93
NR	0	0.00	NR	1	.20	NR	1	.10
	525	100.00		500	100.00		1025	100.01

IN WILLOWBROOK/FLORENCE-FIRESTONE HOW MUCH LITTER DO YOU SEE IN YARDS?								
	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	97	18.48	NONE	38	7.60	NONE	135	13.17
SOME	343	65.33	SOME	345	69.00	SOME	688	67.12
A LOT	62	11.81	A LOT	47	9.40	A LOT	109	10.63
NR	23	4.38	NR	69	13.80	NR	92	8.98
NR	0	0.00	NR	1	.20	NR	1	.10
	525	100.00		500	100.00		1025	100.00

IN WILLOWBROOK/FLORENCE-FIRESTONE HOW MUCH LITTER DO YOU SEE IN STREETS?								
	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	86	16.38	NONE	28	5.60	NONE	114	11.13
SOME	346	65.90	SOME	313	62.60	SOME	659	64.36
A LOT	69	13.14	A LOT	91	18.20	A LOT	160	15.63
NR	23	4.38	NR	68	13.60	NR	90	8.79
NR	1	.19	NR	0	0.00	NR	1	.10
	525	99.90		500	100.00		1024	100.01

IN WILLOWBROOK/FLORENCE-FIRESTONE HOW MUCH LITTER DO YOU SEE IN ALLEYS?								
	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	80	15.24	NONE	16	3.20	NONE	96	9.37
SOME	317	60.38	SOME	157	31.40	SOME	474	46.24
A LOT	95	18.10	A LOT	235	47.00	A LOT	330	32.20
NR	33	6.29	NR	91	18.20	NR	124	12.10
NR	0	0.00	NR	1	.20	NR	1	.10
	525	100.01		500	100.00		1025	100.01

IN WILLOWBROOK/FLORENCE-FIRESTONE HOW MUCH LITTER DO YOU SEE IN VACANT LOTS?								
	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	42	8.00	NONE	22	4.40	NONE	64	6.24
SOME	354	67.43	SOME	129	25.80	SOME	483	47.12
A LOT	104	19.81	A LOT	236	47.20	A LOT	340	33.17
NR	25	4.76	NR	113	22.60	NR	138	13.46
	525	100.00		500	100.00		1025	99.99

IN WILLOWBROOK/FLORENCE-FIRESTONE HOW MUCH LITTER DO YOU SEE AROUND COMMERCIAL BUILDINGS?								
	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	167	31.81	NONE	50	10.00	NONE	217	21.17
SOME	240	45.71	SOME	280	56.00	SOME	520	50.73
A LOT	70	13.33	A LOT	74	14.80	A LOT	144	14.05
NR	48	9.14	NR	95	19.00	NR	143	13.95
NR	0	0.00	NR	1	.20	NR	1	.10
	525	99.99		500	100.00		1025	100.00

COMPARING YOUR NEIGHBORHOOD WITH WILLOWBROOK/FLORENCE-FIRESTONE HOW MUCH LITTER HAVE YOU SEEN IN YARDS?								
	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
LESS	276	52.67	LESS	113	22.60	LESS	389	37.95
SAME	139	26.53	SAME	215	43.00	SAME	354	34.54
MORE	57	10.88	MORE	59	11.80	MORE	116	11.32
NR	52	9.92	NR	113	22.60	NR	166	16.20
	524	100.00		500	100.00		1025	100.01

COMPARING YOUR NEIGHBORHOOD WITH WILLOWBROOK/FLORENCE-FIRESTONE HOW MUCH LITTER HAVE YOU SEEN IN STREETS?								
	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
LESS	271	51.62	LESS	101	20.20	LESS	377	36.29
SAME	143	27.24	SAME	216	43.20	SAME	359	35.02
MORE	60	11.43	MORE	70	14.00	MORE	130	12.68
NR	51	9.71	NR	117	23.40	NR	163	15.90
NR	0	0.00	NR	1	.20	NR	1	.10
	525	100.00		500	100.00		1025	99.99

COMPARING YOUR NEIGHBORHOOD WITH WILLOWBROOK/FLORENCE-FIRESTONE HOW MUCH LITTER HAVE YOU SEEN IN ALLEYS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
LESS	245	46.67	LESS	68	13.60	LESS	313	30.54
SAME	146	27.81	SAME	151	30.20	SAME	297	28.98
MORE	73	13.90	MORE	152	30.40	MORE	225	21.95
NR	61	11.62	NR	129	25.80	NR	190	18.54
	525	100.00		500	100.00		1025	100.01

COMPARING YOUR NEIGHBORHOOD WITH WILLOWBROOK/FLORENCE-FIRESTONE HOW MUCH LITTER HAVE YOU SEEN IN VACANT LOTS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
LESS	231	44.00	LESS	74	14.80	LESS	305	29.76
SAME	160	30.48	SAME	133	26.60	SAME	293	28.59
MORE	77	14.67	MORE	163	32.60	MORE	240	23.41
NR	57	10.86	NR	130	26.00	NR	187	18.24
	525	100.01		500	100.00		1025	100.00

COMPARING YOUR NEIGHBORHOOD WITH WILLOWBROOK/FLORENCE-FIRESTONE HOW MUCH LITTER HAVE YOU SEEN AROUND COMMERCIAL BUILDINGS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
LESS	252	48.00	LESS	84	16.80	LESS	336	32.78
SAME	129	24.57	SAME	208	41.60	SAME	337	32.88
MORE	62	11.81	MORE	76	15.20	MORE	138	13.46
NR	82	15.62	NR	132	26.40	NR	214	20.88
	525	100.00		500	100.00		1025	100.00

IN YOUR NEIGHBORHOOD WHERE YOU HAVE SEEN LITTER TELL US HOW MUCH IT BOTHERS YOU IN YARDS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	213	40.57	NONE	102	20.40	NONE	315	30.73
SOMEWHAT	159	30.29	SOMEWHAT	168	33.60	SOMEWHAT	327	31.90
VERYMUCH	146	27.81	VERYMUCH	224	44.80	VERYMUCH	370	36.10
NR	6	1.14	NR	6	1.20	NR	12	1.17
NR	1	.19	NR	0	0.00	NR	1	.10
	525	100.00		500	100.00		1025	100.00

IN YOUR NEIGHBORHOOD WHERE YOU HAVE SEEN LITTER TELL US HOW MUCH IT BOTHERS YOU IN STREETS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	166	31.62	NONE	91	18.20	NONE	257	25.07
SOMEWHAT	195	37.14	SOMEWHAT	170	34.00	SOMEWHAT	365	35.61
VERYMUCH	159	30.29	VERYMUCH	235	47.00	VERYMUCH	304	29.44
NR	5	.95	NR	4	.80	NR	9	.88
	525	100.00		500	100.00		1025	100.00

IN YOUR NEIGHBORHOOD WHERE YOU HAVE SEEN LITTER TELL US HOW MUCH IT BOTHERS YOU IN ALLEYS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	168	32.00	NONE	77	15.40	NONE	245	23.90
SOMEWHAT	171	32.57	SOMEWHAT	130	26.00	SOMEWHAT	301	29.37
VERYMUCH	172	32.76	VERYMUCH	271	54.20	VERYMUCH	443	43.22
NR	14	2.67	NR	22	4.40	NR	36	3.51
	525	100.00		500	100.00		1025	100.00

IN YOUR NEIGHBORHOOD WHERE YOU HAVE SEEN LITTER TELL US HOW MUCH IT BOTHERS YOU IN ALLEYS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	147	28.00	NONE	81	16.20	NONE	228	22.24
SOMEWHAT	192	36.57	SOMEWHAT	123	24.60	SOMEWHAT	315	30.73
VERYMUCH	174	33.14	VERYMUCH	260	52.00	VERYMUCH	434	42.34
NR	12	2.29	NR	36	7.20	NR	48	4.68
	525	100.00		500	100.00		1025	100.00

IN YOUR NEIGHBORHOOD WHERE YOU HAVE SEEN LITTER TELL US HOW MUCH IT BOTHERS YOU AROUND COMMERCIAL BUILDINGS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NONE	204	38.86	NONE	109	21.80	NONE	313	30.54
SOMEWHAT	125	23.81	SOMEWHAT	170	34.00	SOMEWHAT	295	28.78
VERYMUCH	152	28.95	VERYMUCH	176	35.20	VERYMUCH	328	32.00
NR	44	8.38	NR	44	8.80	NR	88	8.59
NR	0	0.00	NR	1	.20	NR	1	.10
	525	100.00		500	100.00		1025	100.01

IN YOUR NEIGHBORHOOD WHERE YOU HAVE SEEN LITTER, WHAT DO YOU THINK HAS CAUSED IT?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	1	.19	NR	4	.80	NR	5	.49
ANIMALS	124	23.62	ANIMALS	74	14.80	ANIMALS	198	19.32
PEOPLE	253	48.19	PEOPLE	224	44.80	PEOPLE	477	46.54
PR SERV	29	5.52	PR SERV	35	7.00	PR SERV	64	6.24
OTHER 1	8	1.52	OTHER 1	15	3.00	OTHER 1	23	2.24
NR	56	10.67	NR	26	5.20	NR	82	8.00
AN-PEOPL	46	8.76	AN-PEOPL	96	19.20	AN-PEOPL	142	13.85
OTHER 2	8	1.52	OTHER 2	26	5.20	OTHER 2	34	3.32
	525	99.99		500	100.00		1025	100.00

IF PEOPLE ARE THE MAJOR CAUSES OF THESE LITTER PROBLEMS, WHO ARE THEY AND WHY DO YOU THINK THEY DO IT?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	218	41.52	NR	164	32.80	NR	382	37.27
RESPONSE	307	58.48	RESPONSE	336	67.20	RESPONSE	643	62.73
	525	100.00		500	100.00		1025	100.00

HOW OFTEN IS YOUR RUBBISH PICKED UP?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	1	.19	NR	3	.60	NR	4	.39
ONCE-WK	428	81.52	ONCE-WK	474	94.80	ONCE-WK	902	88.00
TWICE-WK	93	17.71	TWICE-WK	21	4.20	TWICE-WK	114	11.12
THREE-WK	0	0.00	THREE-WK	0	0.00	THREE-WK	0	0.00
OTHER	0	0.00	OTHER	0	0.00	OTHER	0	0.00
UNKNOWN	3	.57	UNKNOWN	2	.40	UNKNOWN	5	.49
	525	99.99		500	100.00		1025	100.00

IS THIS OFTEN ENOUGH?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	3	.57	NR	5	1.00	NR	8	.78
YES	447	85.14	YES	382	76.40	YES	829	80.88
NO	75	14.29	NO	113	22.60	NO	188	18.34
	525	100.00		500	100.00		1025	100.00

IF NO, WHY NOT?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	460	87.62	NR	396	79.20	NR	856	83.51
RESPONSE	64	12.19	RESPONSE	104	20.80	RESPONSE	168	16.39
NR	1	.19	NR	0	0.00	NR	1	.10
	525	100.00		500	100.00		1025	100.00

HOW OFTEN ARE LARGE BULKY ITEMS PICKED UP?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	1	.19	NR	11	2.20	NR	12	1.17
WEEK	97	18.48	WEEK	53	10.60	WEEK	150	14.63
MONTH	18	3.43	MONTH	50	10.00	MONTH	68	6.63
YEAR	24	4.57	YEAR	96	19.20	YEAR	120	11.71
CALL	135	25.71	CALL	112	22.40	CALL	247	24.10
UNKNOWN	240	47.62	UNKNOWN	178	35.60	UNKNOWN	478	41.76
	525	100.00		500	100.00		1025	100.00

IS THIS OFTEN ENOUGH?

	TOTAL SAMPLE	% TOTAL
NR	200	38.10
YES	289	55.05
NO	36	6.86
	525	100.01

	TOTAL SAMPLE	% TOTAL
NR	112	22.40
YES	312	62.40
NO	76	15.20
	500	100.00

	TOTAL SAMPLE	% TOTAL
NR	312	30.44
YES	601	58.63
NO	112	10.93
	1025	100.00

IF NOT, WHY NOT?

	TOTAL SAMPLE	% TOTAL
NR	499	95.05
RESPONSE	25	4.76
NR	1	.19
	525	100.00

	TOTAL SAMPLE	% TOTAL
NR	453	90.60
RESPONSE	47	9.40
NR	0	0.00
	500	100.00

	TOTAL SAMPLE	% TOTAL
NR	952	92.88
RESPONSE	72	7.02
NR	1	.10
	1025	100.00

IS THERE ANY WAY YOU CAN GET BULKY TRASH ITEMS PICKED UP MORE OFTEN?

	TOTAL SAMPLE	% TOTAL
NR	368	70.10
RESPONSE	155	29.52
NR	2	.38
	525	100.00

	TOTAL SAMPLE	% TOTAL
NR	262	52.40
RESPONSE	238	47.60
NR	0	0.00
	500	100.00

	TOTAL SAMPLE	% TOTAL
NR	630	61.46
RESPONSE	392	38.34
NR	2	.20
	1025	100.00

HOW OFTEN IS YOUR GARBAGE PICKED UP?

	TOTAL SAMPLE	% TOTAL
NR	3	.57
ONCE	417	79.43
TWICE	101	19.24
THREE	0	0.00
FOUR OR>	0	0.00
UNKNOWN	4	.76
	525	100.00

	TOTAL SAMPLE	% TOTAL
NR	6	1.20
ONCE	461	92.20
TWICE	23	4.60
THREE	0	0.00
FOUR OR>	0	0.00
UNKNOWN	10	2.00
	500	100.00

	TOTAL SAMPLE	% TOTAL
NR	9	.88
ONCE	878	85.66
TWICE	124	12.10
THREE	0	0.00
FOUR OR>	0	0.00
UNKNOWN	14	1.37
	1025	100.01

IS THIS OFTEN ENOUGH?

	TOTAL SAMPLE	% TOTAL
NR	9	1.71
YES	460	87.62
NO	56	10.67
	525	100.00

	TOTAL SAMPLE	% TOTAL
NR	15	3.00
YES	419	83.80
NO	66	13.20
	500	100.00

	TOTAL SAMPLE	% TOTAL
NR	24	2.34
YES	870	85.76
NO	122	11.90
	1025	100.00

IF NOT, WHY NOT?

	TOTAL SAMPLE	% TOTAL
NR	481	91.62
RESPONSE	43	8.19
NR	1	.19
	525	100.00

	TOTAL SAMPLE	% TOTAL
NR	443	88.60
RESPONSE	57	11.40
NR	0	0.00
	500	100.00

	TOTAL SAMPLE	% TOTAL
NR	924	90.15
RESPONSE	100	9.76
NR	1	.10
	1025	100.01

DO YOU HAVE A GARBAGE GRINDER IN YOUR SINK?

	TOTAL SAMPLE	% TOTAL
NR	9	1.71
YES	152	28.95
NO	363	69.14
NR	1	.19
	525	99.99

	TOTAL SAMPLE	% TOTAL
NR	13	2.60
YES	60	12.00
NO	427	85.40
NR	0	0.00
	500	100.00

	TOTAL SAMPLE	% TOTAL
NR	22	2.15
YES	212	20.68
NO	790	77.07
NR	1	.10
	1025	100.00

DO RUBBISH/GARBAGE CONTAINERS PLACED AT THE CURB ON COLLECTION DAY BOTHER YOU?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	6	1.14	NR	9	1.80	NR	15	1.46
YES	80	15.24	YES	108	21.60	YES	188	18.34
NO	439	83.62	NO	383	76.60	NO	822	80.20
	525	100.00		500	100.00		1025	100.00

WHY?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	444	84.57	NR	392	78.40	NR	836	81.56
RESPONSE	78	14.86	RESPONSE	108	21.60	RESPONSE	186	18.15
NR	3	.57	NR	0	0.00	NR	3	.29
	525	100.00		500	100.00		1025	100.00

DO YOU EXPERIENCE ANY PROBLEMS IN STORING YOUR GARBAGE AND RUBBISH BETWEEN DAYS OF COLLECTION?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	6	1.14	NR	11	2.20	NR	17	1.66
YES	58	11.05	YES	53	10.60	YES	111	10.83
NO	461	87.81	NO	436	87.20	NO	897	87.51
	525	100.00		500	100.00		1025	100.00

WHY?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	481	91.62	NR	449	89.80	NR	930	90.73
RESPONSE	42	8.00	RESPONSE	51	10.20	RESPONSE	93	9.07
NR	2	.38	NR	0	0.00	NR	2	.20
	525	100.00		500	100.00		1025	100.00

HOW LONG DO YOUR GARBAGE AND RUBBISH CANS LAST?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	6	1.14	NR	14	2.80	NR	20	1.95
< .5 YR	53	10.10	< .5 YR	59	11.80	< .5 YR	112	10.93
.5-1 YR	127	24.19	.5-1 YR	168	33.60	.5-1 YR	295	28.78
1-2 YRS	244	46.48	1-2 YRS	189	37.80	1-2 YRS	433	42.24
> 2 YRS	95	18.10	> 2 YRS	69	13.80	> 2 YRS	164	16.00
NR	0	0.00	NR	1	.20	NR	1	.10
	525	100.01		500	100.00		1025	100.00

HOW MANY RUBBISH/GARBAGE CONTAINERS DO YOU OWN?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	4	.76	NR	10	2.00	NR	14	1.37
ONE	21	4.00	ONE	64	12.80	ONE	85	8.29
TWO	143	27.24	TWO	144	28.80	TWO	287	28.00
THREE	239	45.52	THREE	196	39.20	THREE	435	42.44
FOUR OR >	117	22.29	FOUR OR >	86	17.20	FOUR OR >	203	19.80
NR	1	.19	NR	0	0.00	NR	1	.10
	525	100.00		500	100.00		1025	100.00

HOW MUCH DO YOU PAY EACH MONTH FOR GARBAGE AND RUBBISH COLLECTION?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	3	.57	NR	7	1.40	NR	10	.98
FREE	94	17.90	FREE	219	43.80	FREE	313	30.54
< \$1	2	.38	< \$1	2	.40	< \$1	4	.39
\$1-2	3	.57	\$1-2	4	.80	\$1-2	7	.68
\$2-3	8	1.52	\$2-3	0	0.00	\$2-3	8	.78
\$3 OR >	4	.76	\$3 OR >	2	.40	\$3 OR >	6	.59
UNKNOWN	411	78.29	UNKNOWN	266	53.20	UNKNOWN	177	66.05
	525	99.99		500	100.00		1025	100.01

HAVE YOU EVER PURCHASED PLASTIC TRASH BAGS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	5	.95	NR	7	1.40	NR	12	1.17
YES	243	46.29	YES	216	43.20	YES	459	44.78
NO	277	52.76	NO	277	55.40	NO	554	54.05
	525	100.00		500	100.00		1025	100.00

IF YES, DO YOU REGULARLY USE THEM?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	252	48.00	NR	185	37.00	NR	437	42.63
YES	161	30.67	YES	146	29.20	YES	307	29.95
NO	112	21.33	NO	169	33.80	NO	281	27.41
	525	100.00		500	100.00		1025	99.99

WOULD YOU BE WILLING TO KEEP GLASS OR CANS OR NEWSPAPERS SEPARATE FROM YOUR OTHER RUBBISH IF IT WOULD HELP SOLVE THE LITTER PROBLEM IN YOUR NEIGHBORHOOD?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	2	.38	NR	9	1.80	NR	11	1.07
YES	345	65.71	YES	276	55.20	YES	621	60.59
NO	178	33.90	NO	215	43.00	NO	393	38.34
	525	99.99		500	100.00		1025	100.00

IF YES, WOULD YOU BE WILLING TO TAKE THE GLASS, CANS, AND PAPERS TO A SPECIAL COLLECTION PLACE?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	164	31.24	NR	110	22.00	NR	274	26.73
YES	99	18.86	YES	85	17.00	YES	184	17.95
NO	262	49.90	NO	305	61.00	NO	567	55.32
	525	100.00		500	100.00		1025	100.00

IF YES, HOW FAR WOULD YOU BE WILLING TO GO TO TAKE YOUR GLASS, CANS, AND PAPERS TO A SPECIAL COLLECTION PLACE?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	433	82.48	NR	418	83.60	NR	851	83.00
NEIGHBD	72	13.71	NEIGHBD	54	10.80	NEIGHBD	126	12.20
WI-FL-FI	12	2.29	WI-FL-FI	20	4.00	WI-FL-FI	32	3.12
LA COUNT	6	1.14	LA COUNT	8	1.60	LA COUNT	14	1.37
NR	2	.38	NR	0	0.00	NR	2	.20
	525	100.00		500	100.00		1025	100.00

IF NO, WOULD YOU BE WILLING TO SEPARATE GLASS, CANS, AND PAPERS AND TAKE THEM TO A SPECIAL COLLECTION PLACE IF YOU WERE PAID 1¢ EACH OR GIVEN TRADING STAMPS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	168	32.00	NR	126	25.20	NR	294	28.68
YES	150	28.57	YES	92	18.40	YES	242	23.61
NO	207	39.43	NO	282	56.40	NO	489	47.71
	525	100.00		500	100.00		1025	100.00

IF YES, HOW FAR WOULD YOU BE WILLING TO TAKE YOUR GLASS, CANS, AND PAPERS TO A SPECIAL COLLECTION PLACE?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	357	68.00	NR	398	79.60	NR	755	73.66
NEIGHBD	129	24.57	NEIGHBD	73	14.60	NEIGHBD	202	19.71
WI-FL-FI	22	4.19	WI-FL-FI	21	4.20	WI-FL-FI	43	4.20
LA COUNT	16	3.05	LA COUNT	8	1.60	LA COUNT	24	2.34
NR	1	.19	NR	0	0.00	NR	1	.10
	525	100.00		500	100.00		1025	100.01

DO YOU KNOW OF ANY PLACE WHERE YOU CAN NOW TAKE GLASS, CANS, OR NEWSPAPERS FOR MONEY OR TRADING STAMPS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	9	1.71	NR	10	2.00	NR	10	1.85
YES	47	8.95	YES	78	15.60	YES	125	12.20
NO	469	89.33	NO	412	82.40	NO	881	86.95
	525	99.99		500	100.00		1025	100.00

DO YOU DO THIS?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	479	91.24	NR	425	85.00	NR	904	88.20
YES	10	1.90	YES	23	4.60	YES	33	3.22
NO	36	6.86	NO	51	10.20	NO	87	8.40
NR	0	0.00	NR	1	.20	NR	1	.10
	525	100.00		500	100.00		1025	100.01

HOW LONG HAVE YOU LIVED IN THIS NEIGHBORHOOD?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	6	1.14	NR	14	2.80	NR	20	1.95
0-1 YR	46	8.76	0-1 YR	83	16.60	0-1 YR	129	12.59
1-5 YRS	242	46.10	1-5 YRS	179	35.80	1-5 YRS	421	41.07
> 5 YRS	230	43.81	> 5 YRS	224	44.80	> 5 YRS	454	44.29
NR	1	.19	NR	0	0.00	NR	1	.10
	525	100.00		500	100.00		1025	100.00

WHAT AGE GROUP ARE YOU IN?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	5	.95	NR	8	1.60	NR	13	1.27
< 20	26	4.96	< 20	23	4.60	< 20	49	4.79
20-30	121	23.09	20-30	105	21.00	20-30	226	22.07
31-40	155	29.58	31-40	142	28.40	31-40	297	29.00
41-50	149	28.44	41-50	132	26.40	41-50	281	27.44
51-60	47	8.97	51-60	49	9.80	51-60	96	9.38
> 60	21	4.01	> 60	41	8.20	> 60	62	6.05
	524	100.00		500	100.00		1024	100.00

WHERE DID YOU LIVE PRIOR TO MOVING INTO THE WILLOWBROOK/FLORENCE-FIRESTONE COMMUNITY?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	12	2.29	NR	10	2.00	NR	22	2.15
LA COUNT	369	70.29	LA COUNT	384	76.80	LA COUNT	753	73.46
CALIFORN	109	20.76	CALIFORN	53	10.60	CALIFORN	162	15.80
STATE	34	6.48	STATE	44	8.80	STATE	78	7.61
COUNTRY	1	.19	COUNTRY	9	1.80	COUNTRY	10	.98
	525	100.01		500	100.00		1025	100.00

WHICH STATE?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	484	92.19	NR	456	91.20	NR	940	91.71
RESPONSE	41	7.81	RESPONSE	44	8.80	RESPONSE	85	8.29
	525	100.00		500	100.00		1025	100.00

WHICH COUNTRY?

	TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL		TOTAL SAMPLE	% TOTAL
NR	520	99.05	NR	491	98.20	NR	1011	98.63
RESPONSE	4	.76	RESPONSE	9	1.80	RESPONSE	13	1.27
NR	1	.19	NR	0	0.00	NR	1	.10
	525	100.00		500	100.00		1025	100.00

SEX?

	TOTAL SAMPLE	% TOTAL
NR	2	.38
MALE	187	35.62
FEMALE	335	63.81
NR	1	.19
	525	100.00

NR
MALE
FEMALE
NR

	TOTAL SAMPLE	% TOTAL
NR	5	1.00
MALE	132	26.40
FEMALE	363	72.60
NR	0	0.00
	500	100.00

NR
MALE
FEMALE
NR

	TOTAL SAMPLE	% TOTAL
NR	7	.68
MALE	319	31.12
FEMALE	698	68.10
NR	1	.10
	1025	100.00

DO YOU OWN YOUR HOME OR RENT?

	TOTAL SAMPLE	% TOTAL
NR	5	.95
OWN	326	62.10
RENT	194	36.95
	525	100.00

NR
OWN
RENT

	TOTAL SAMPLE	% TOTAL
NR	6	1.20
OWN	203	40.60
RENT	291	58.20
	500	100.00

NR
OWN
RENT

	TOTAL SAMPLE	% TOTAL
NR	11	1.07
OWN	529	51.61
RENT	485	47.32
	1025	100.00

HOW MANY CHILDREN WHO LIVE WITH YOU ARE BETWEEN THE AGES OF 12 AND 20?

	TOTAL SAMPLE	% TOTAL
NR	24	4.57
0-1	250	47.62
2-3	206	39.24
3-4	24	4.57
4 OR >	20	3.81
NR	1	.19
	525	100.00

NR
0-1
2-3
3-4
4 OR >
NR

	TOTAL SAMPLE	% TOTAL
NR	52	10.40
0-1	250	50.00
2-3	128	25.60
3-4	42	8.40
4 OR >	28	5.60
NR	0	0.00
	500	100.00

NR
0-1
2-3
3-4
4 OR >
NR

	TOTAL SAMPLE	% TOTAL
NR	75	7.41
0-1	500	48.78
2-3	334	32.59
3-4	66	6.44
4 OR >	40	4.68
NR	1	.10
	1025	100.00

WHICH OF THE FOLLOWING BEST DESCRIBES THE LIVING QUARTERS OF THIS FAMILY?

	TOTAL SAMPLE	% TOTAL
NR	4	.76
SF DET	440	83.81
2F & ROW	73	13.90
APT-BLDG	8	1.52
APT-BUS	0	0.00
ROOM HSE	0	0.00
NT HOTEL	0	0.00
OTHER	0	0.00
	525	99.99

NR
SF DET
2F & ROW
APT-BLDG
APT-BUS
ROOM HSE
NT HOTEL
OTHER

	TOTAL SAMPLE	% TOTAL
NR	6	1.20
SF DET	424	84.80
2F & ROW	41	8.20
APT-BLDG	26	5.20
APT-BUS	0	0.00
ROOM HSE	0	0.00
NT HOTEL	0	0.00
OTHER	3	.60
	500	100.00

NR
SF DET
2F & ROW
APT-BLDG
APT-BUS
ROOM HSE
NT HOTEL
OTHER

	TOTAL SAMPLE	% TOTAL
NR	10	.98
SF DET	864	84.29
2F & ROW	114	11.12
APT-BLDG	34	3.32
APT-BUS	0	0.00
ROOM HSE	0	0.00
NT HOTEL	0	0.00
OTHER	3	.29
	1025	100.00

APPENDIX C

PRELIMINARY ANALYSIS OF SYSTEM FEASIBILITY

A. Estimated Hardware Costs for Each Alternative

Unit cost, installation, and estimated amortized costs for the "hardware" components of each alternative are presented in Table C-1.

Assumptions made in deriving the amortized costs are noted. Because each system includes common elements of supplemental street sweeping, sidewalk litter containers, etc., the hardware costs for these elements are excluded from the table.

B. Salvage Value of Area Waste Materials

Discussions were held with representatives of metal, glass, and paper salvage firms in the Los Angeles area. The present and future outlook for solid waste reclamation efforts in the study area were discussed. Ongoing glass and metal container reclamation programs locally and in other areas were reviewed.

Local prices for glass cullet were obtained. A South Gate firm pays the following prices for segregated glass delivered to its plant without restrictions on cleaning or removal of labels, caps, or metal rings.

- Clear @ \$9/ton
- Mixed colored @ \$7/ton
- Colored @ \$7/ton

Local members of the Glass Container Manufacturers Institute are participating in a glass recycling effort. Payments of \$20 per ton are made for glass delivered to their plants sorted by color--clear, green, amber, and blue. Paper labels may be left on, but aluminum neck rings and covers or caps on glass jars must be removed. Washing is not required. Members of the Institute have glass receiving points near the study area.

The Carbonated Beverage Container Manufacturers Association has established eight can recycling centers in or near Los Angeles; three are close to the study area. Community organizations are encouraged to participate in can collection drives and deliver the collected materials to the receiving stations. The Association pays an amount ranging from \$10 per ton for bimetallic containers to \$200 per ton for aluminum cans. A local salvage firm indicated it would pay \$15 per ton for mixed tin cans delivered in an "as is" condition to the plant location.

TABLE C-1

HARDWARE COSTS FOR EACH ALTERNATIVE
SOLID WASTE MANAGEMENT SYSTEM

Alternative system	Purchase ¹ (\$/unit)	Installation (\$/unit)	Amortized cost (\$/unit/mo.)
I	\$200. 0.30 (bags)	\$25 ²	\$4.47 ³
II	\$ 25. 3.50 (containers)	50 ²	0.91 ⁴
III	3.50 0.06 (bags)	--	0.32 ⁵
IV	3.50	--	0.30 ⁶
V	3.50 0.06 (bags)	--	0.42 ⁷
VI	--	--	--
VII	0.06	--	0.32 ⁵
VIII	3.50	--	0.20 ⁸
IX	\$ 45.	--	0.80 ⁹
X	\$ 45. 0.06 (bags)	--	0.92 ¹⁰

¹Estimated average cost per item of hardware used as the primary component in the system, i.e. household compactor, garbage grinder, disposable bag, refuse container, etc.

²Estimated average cost for installation of the household compactor and garbage grinder.

³Ten year life on compactor (zero salvage); average of two bags/week @ \$0.30 per bag.

⁴Ten year life (zero salvage) grinder, 3 containers with 3 year life.

⁵Assumes use of 4 bags per week and one container for bag holder.

⁶Three containers with 3 year life.

⁷Assumes two extra bags per month for salvage materials.

⁸Assumes two containers with 3 year life.

⁹Based on 5 year life.

¹⁰Two bags per month for salvage material, 5 year life on container.

Recent trials of paper salvage have not been encouraging. Voluntary citizen separation of newspaper in the home has failed locally due to a lack of a market for the separated material. A trial program involving 6000 dwelling units in Newport Beach was discontinued early this year when collected paper could not be sold.

Massive efforts at paper salvage are being backed by the Container Corporation of America in Chicago. The Westside Community Paper Stock Corporation, an experiment in black capitalism, was provided a \$350,000 loan guarantee by the Container Corporation. The company also guaranteed a market for all wastepaper the Paper Stock Corporation could collect and process. Although still in operation at last report, the operation has not been financial success. Significant improvements in wastepaper recycling levels will probably require an expansion of markets for products currently made from wastepaper; development of new products which utilize reclaimed fibers; and improvement in the total economics of recycling. This will require a concerted national effort.

There is little or no market for other items found in residential solid wastes. The influx of synthetic fibers has reduced rag salvage from refuse to negligible amounts. Salvage of plastic from urban refuse for recycling or reuse is unlikely to be economical in the foreseeable future.

The potential value of readily salvable portions of the study area solid wastes can be estimated based on the composition of the wastes. Table III-2 in the text presented refuse composition. Readily salvable components are believed limited to the metals and glass at this time. Under optimum conditions, a separate collection system might recover 75 percent of the available materials. Metals were found to comprise 8.6 percent of area wastes. Nonferrous metals content was not separately determined during the field sampling; however, based on city of Los Angeles work, it is estimated that nonferrous metals comprise about 10 percent of the metal portion or 0.9 percent of the total waste stream. Glass comprises 9.7 percent of the wastes. Sorting by color in the home for separate collection would require too many separate containers, therefore salvage value will be assumed at the mixed unprepared rate of \$7 per ton. Potential salvage value of study area wastes would thus be:

Glass:	9.7%(0.75) (120 tons/day)	\$7/ton =	\$61/day
	or 9.7%(0.75) (\$7/ton)	=	\$0.51/ton of refuse

Metal:			
	Ferrous - 7.7%(0.75) (120)	\$15/ton =	\$104/day
	or 7.7%(0.75) (\$15/ton)	=	\$0.87/ton of refuse

Nonferrous	-	0.9%	(0.75)	(120)	\$200/ton	=	\$162/day
or		0.9%	(0.75)	(\$200/ton)		=	1.35/ton of refuse

Totals would be:

		<u>\$/day</u>
Glass		\$ 61
Metal		266
	Total	<u>\$327/day</u>
		<u>\$/ton of refuse</u>
Glass		\$0.51
Metal		2.22
	Total	<u>\$2.73/ton of refuse</u>

C. Effects on Refuse Collection Operations and Costs

A significant constraint on the selection of the demonstration system lies in its affect on the present contractor's operations. The contractor holds a 4 1/2 year contract and has purchased new equipment for operations. Systems adversely affecting economics of this operation or requiring changes in collection truck capacity or crew size would have little or no chance for implementation. Fortunately, methods and procedures used by the contractor are efficient.

The time required for the collection and disposal of refuse from residential areas can be expressed by the following formula:

$$X = \frac{Vtd}{Q} + B + K + D \text{ where}$$

X = time required for refuse collection, haul, and disposal - minutes

V = truck volume - cu yds

t = average time to collect refuse from each service plus travel time between each stop on the route - minutes

d = truck density of refuse - lbs/cu yd

Q = average quantity of refuse per service - lbs

B = one-way travel time from the route to the disposal site - minutes

K = nonproductive time which includes: dispatch, lunch, and relief time; travel from the yard to the route; and travel from the disposal site to the yard - minutes

D = disposal time - minutes

For the study area collection contractor, the values for the equation have been estimated as follows:

V: 37.2 cu yd

t: collection location in the study area is either the curb or alley location. Since only 5 percent of the stops are alley, (t) values will be those for curb collections.

Our work indicates that collections and travel between stops now average 1.0 minutes/stop. This value will vary with the alternative waste management system being considered.

d: density of refuse in the compactor truck was estimated from load data received from the contractor. Loads averaged 23,000 lbs or 600 lbs/cu yd.

Q: data indicated average quantity of 88 lbs/service. Although this quantity will vary during the year, we have not compensated for this variation in this preliminary analysis.

B: Based on information obtained, one-way travel time to the disposal site averages 45 minutes.

K: The following has been assumed for contractor conditions:

Dispatch time	- 20 min
Lunch and relief	- 30 min
Yard to route	- 45 min
Disposal site to yard	- <u>5 min</u>
	100 min/day

D: assumed at 10 minutes/load

The cost for collection and disposal of refuse has three components; direct labor costs, equipment owning and operating costs, and overhead costs.

Direct labor costs for refuse collection were calculated based on salary rates required in the collection contract. Fringes were estimated at 20 percent of direct labor.

Driver/Loader	- \$3.44/hr
Fringe benefits	- <u>0.69</u>
Total	\$4.13/hr or \$33/day

Equipment owning and operating costs vary with truck type and size. We have estimated costs based on information with similar units operating in the city of Inglewood and from the manufacturer. Costs are summarized in Table C-2.

TABLE C-2
EQUIPMENT COST ESTIMATE

Truck	First cost (\$)	Hourly Costs (\$)		Total hourly	Daily cost (\$)
		Depreciation ¹	Operating & maintenance ²		
37 cu yd Shu-Pak	25,000	3.12	2.50	5.62	45

¹Based on 5 year capital recovery with interest at 10 percent.

²From records of maintenance department.

Incomplete information was available on overhead costs. These would include administrative expense, supervision, disposal charges, costs of the annual cleanup campaign, profit and miscellaneous other expenses. These can be estimated as equal to the direct costs of equipment and labor.

<u>Cost Category</u>	<u>Daily Cost per Crew (\$)</u>
Labor	33
Equipment	25
M & O	<u>20</u>
Total Direct	\$78
Overhead	<u>78</u>
Total	<u>\$156</u>

We have also based our analysis on the following assumptions:

1. Crews are paid for eight hours even if they complete the day sooner.
2. No overtime allowed.

3. Crews will be required to return for a second load provided at least 1/4 load can be collected. If not, they return to the yard.
4. All refuse is taken to the disposal site on the day it is collected.

Preliminary cost calculations were made for each alternative system. Results are presented in Table C-3. Costs have been reduced to a common base for comparison purposes. Since assessments for refuse collection service are made on the basis of electric meters, the average cost per meter per week was used.

TABLE C-3
ECONOMIC ANALYSIS SUMMARY

Alternative system	Estimated Cost/Meter/Week				Total (1)
	Collection	Containers	Container Distribution	Gross income for salvage	
I	24¢	60¢	--	--	\$1.37
II	24¢	3¢ ⁽⁴⁾	<1¢	--	43¢
III	36¢ ⁽¹⁾	13¢	1¢	--	50¢
IV	24¢	3¢ ⁽⁴⁾	<1¢	--	27¢
V	36¢ ⁽³⁾	16¢	1¢	7¢	46¢
VI	43¢	--	--	--	43¢
VII	54¢	13¢	1¢	--	68¢
VIII	43¢	3¢	<1¢	--	46¢
IX	27¢	11¢	<1¢	--	38¢
X	26¢ ⁽²⁾	11¢	<1¢	7¢	31¢
Present (6)	35¢ ⁽⁷⁾	1¢ ⁽⁵⁾	--	--	36¢

- (1) Includes amortized hardware costs from Table C-1.
- (2) Includes 3¢ for collection of salvage.
- (3) Includes collection of salvage.
- (4) Based on 3 containers @ \$3.50 each lasting 3 years.
- (5) Based on 3 containers @ \$3.50 each lasting 6 years.
- (6) Based on \$1.5135/meter/month service fee.
- (7) Includes separate collection of garbage twice weekly.

GLOSSARY

Combustible Rubbish. All combustible material including but not limited to paper, rags, discarded household bedding, excelsior, or other packing materials, cardboard cartons, boxes and containers of wood or fiber, sawdust, or shavings from lumber yards, mills, factories, or shops, lumber scraps, wood or wooden articles, grass, trees, plants, vines and the prunings thereof.

Garbage. All animal and vegetable refuse from kitchens of households or restaurants, all household waste which has been prepared for or been used for food, or shall have resulted from the preparation of food or table refuse or offal, and every accumulation of animal, vegetable, or other matter that attends the preparation, consumption, decay dealing in or storage of meats, fish, fowls, fruits, or vegetables, and shall include all garbage which shall have resulted from sorting or the commercial preparation or processing of food products in canneries, dehydrating plants, preserving works, pickling works, or other food manufactureres or distributors.

Litter. Carelessly strewn, spilled, or discarded waste materials of human origin on vacant lots, sidewalks, streets, alleys, parkways, and private property.

Noncombustible Rubbish. All refuse matter not included within the term "combustible rubbish" and shall include but not be limited to ashes, bottles, broken glass, crockery, earthenware, tin cans, tinware, wire netting, articles of discarded metal or stone, automobile tires and tubes, batteries, metal kegs, barrels, casks, water heaters and dismantled incinerators, plaster, stucco, dirt, rocks, brick, and other such building material.

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